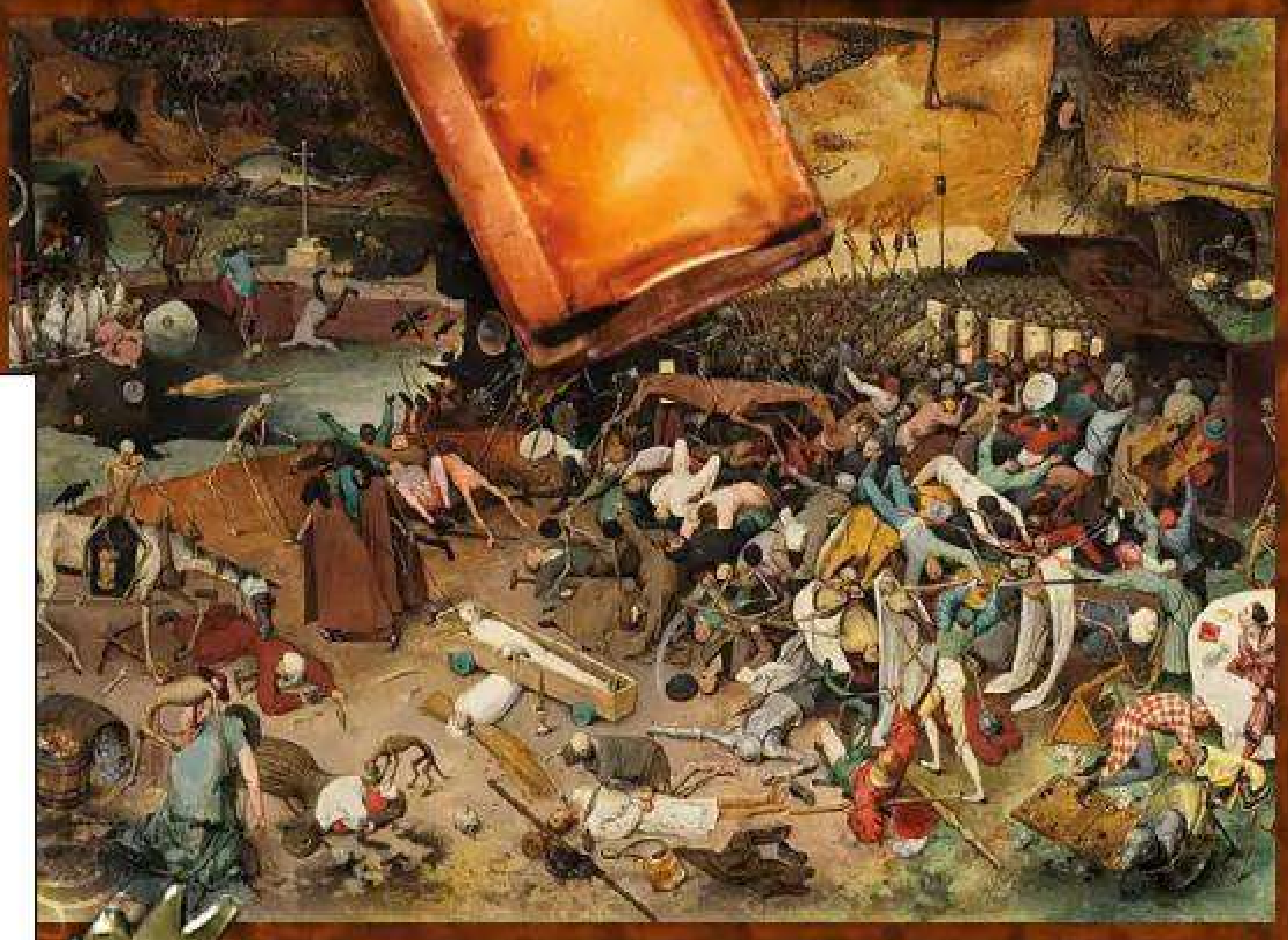
MEDIEVAL MEDICINE

Explore the bizarre beliefs and remedies of the Middle Ages

Inside
TOP 10 CAUSES OF DEATH



FROM THE MAKERS OF ALL ABOUT HISTORY

Digital Edition
SECOND EDITION
FUTURE

BARBER-SURGEONS • LEPERS • REMEDIES • BLACK DEATH • & MORE

Welcome

Do you dare visit the chambers of a medieval physician? How about his street-corner cousin, the barber-surgeon, ever ready with blade and bandage to draw your blood? Or a prescription from your local apothecary, who might do you just as much good as one of the great learned doctors of Arabian medicine, whose scientific knowledge revolutionised pharmacology in Europe? Maybe the local cunning woman is more your style (or budget)? She might be wise in the way of herbs. Or she might just tell you to strap a chicken to your head and get on with it – before the local priest has her carted off for witchcraft, that is. Whatever interests you about the bizarre, gruesome, and occasionally healing properties of medieval medicine, you can find it here...

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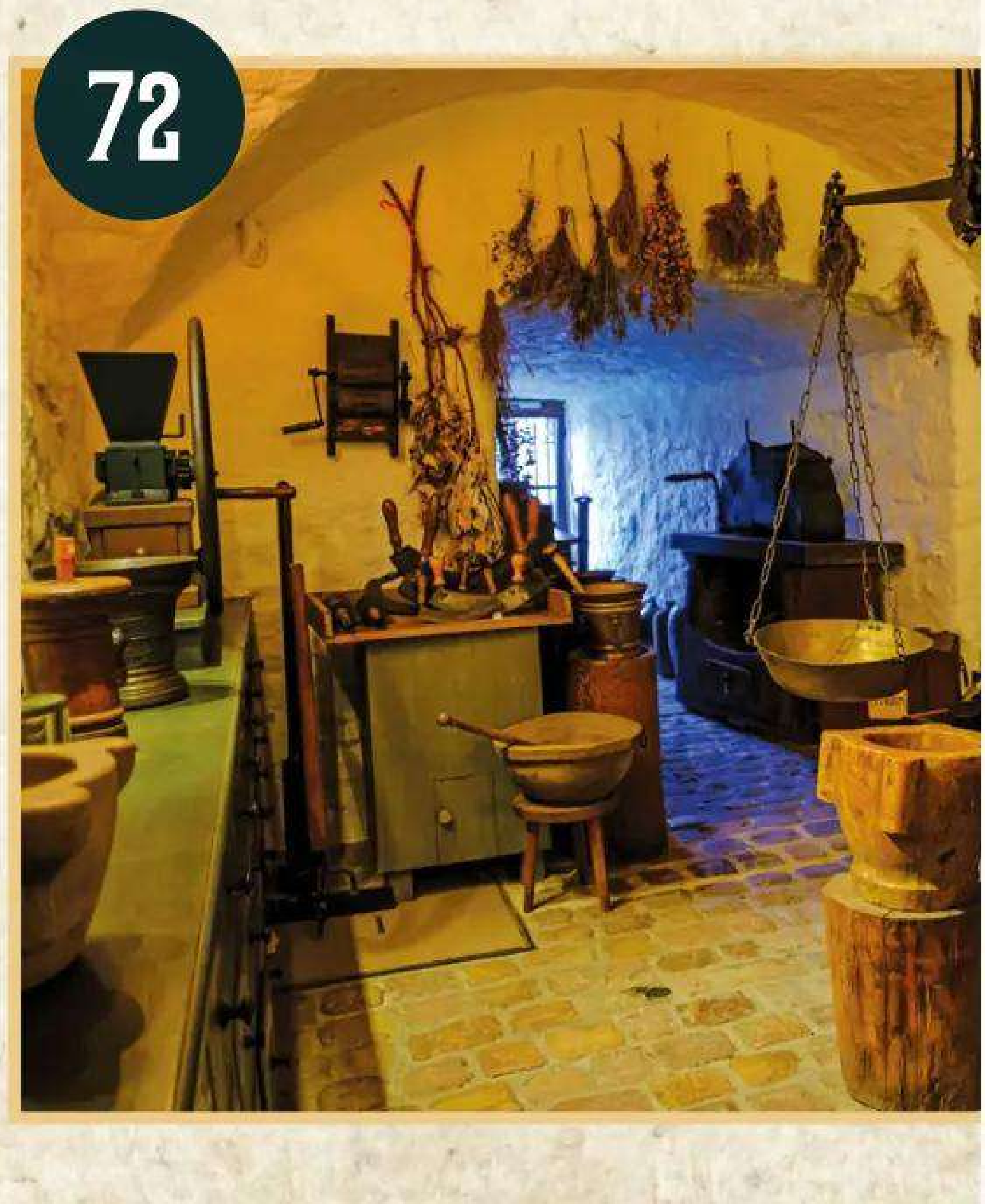
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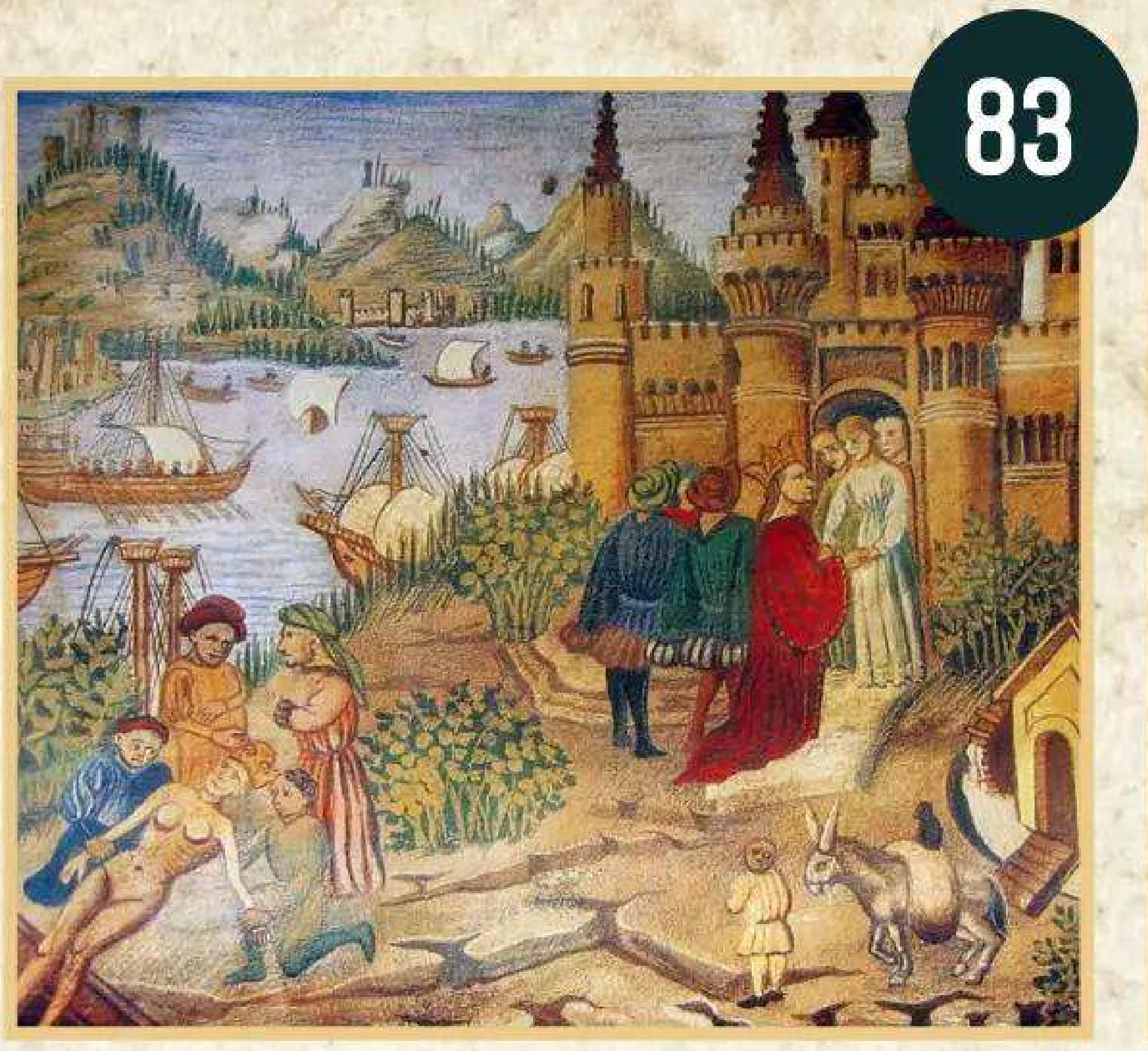
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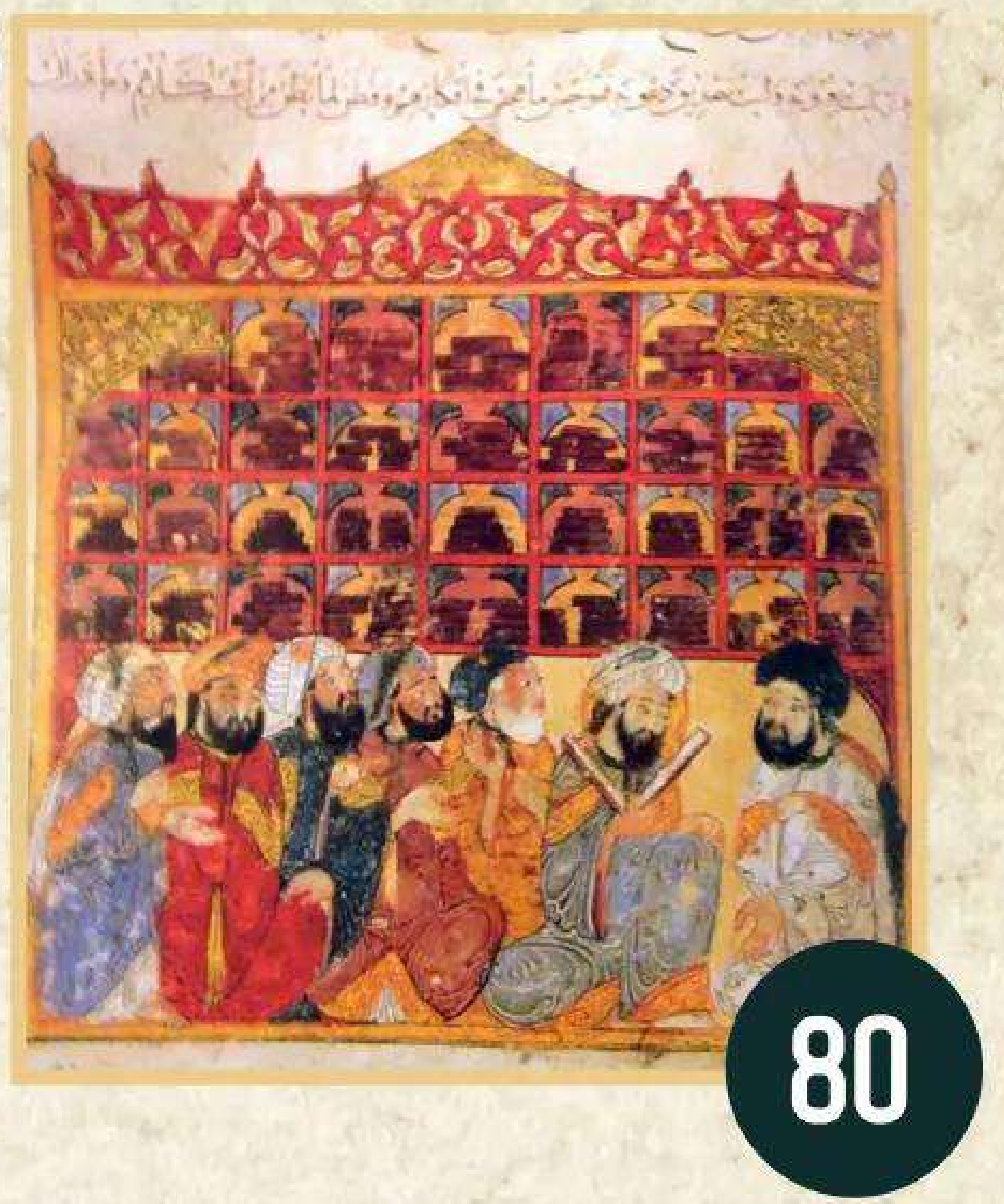
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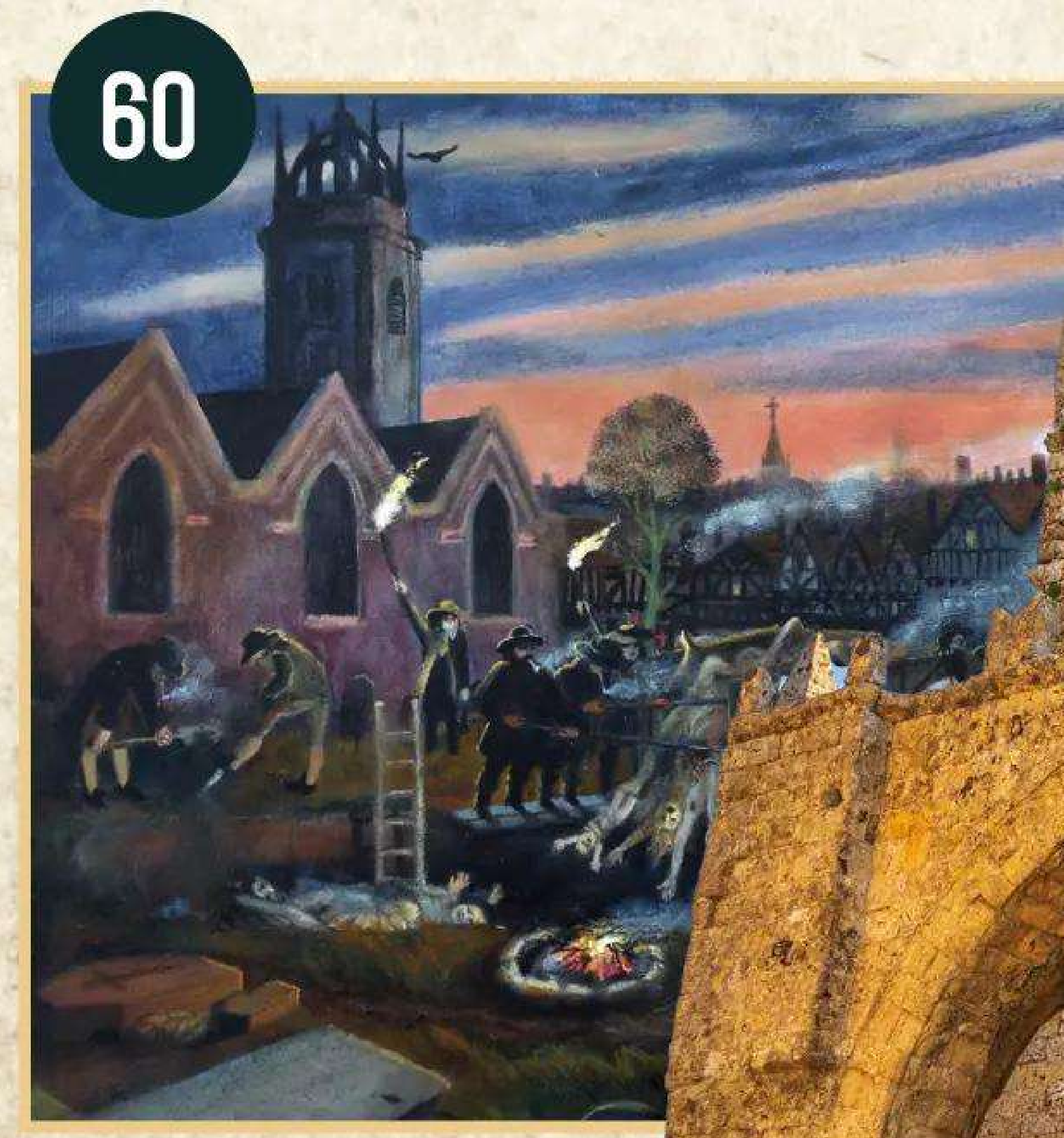
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MEDIEVAL MEDICINE

Discover the development of medicine during the medieval period, from groundbreaking texts to medical firsts

THE JUSTINIAN PLAGUE

25-50 MILLION
Number of estimated deaths across the empire

Approximate number of deaths each day in Constantinople during the plague
10,000

This was the **FIRST** major outbreak of bubonic plague in the world

541-542

WRITING IT DOWN

Greek physician Paul of Aegina creates his seven-volume medical encyclopaedia, incorporating his own knowledge with that of the ancient Greeks and Romans – it would remain popular for the next 800 years.

7TH CENTURY

DEATH OF A KING

King Richard I of England dies after the Siege of Châlus, following a botched attempt by a surgeon to remove an arrowhead from his shoulder, with the wound turning gangrenous.

Soldiers on the battlefield were treated by barber-surgeons – pulling teeth and amputating limbs

1199

ARRIVAL OF SURGERY

The surgical field emerges due to the establishment of the University of Paris, followed by other European universities such as the ones in Bologna and Oxford.

1150

SPREADING THE KNOWLEDGE

Starting in the 12th century, numerous ancient texts on astrology are translated into Latin, not only influencing medical practice but becoming a staple of European medicine.

12TH CENTURY

INFLUENCING MEDICINE

Avicenna completes his encyclopaedia, *The Canon of Medicine*, one of the most famous medical treatises in Europe. In it he discusses the four humours, introducing it to medieval medicine from Greco-Roman.

1025

A NEW DIAGNOSIS

Gilbert the Englishman, a priest and physician, finishes his *Compendium Medicinae*, in which he offers the first diagnosis of leprosy. It is subsequently translated into several languages.

1250

PRACTICAL TEACHING

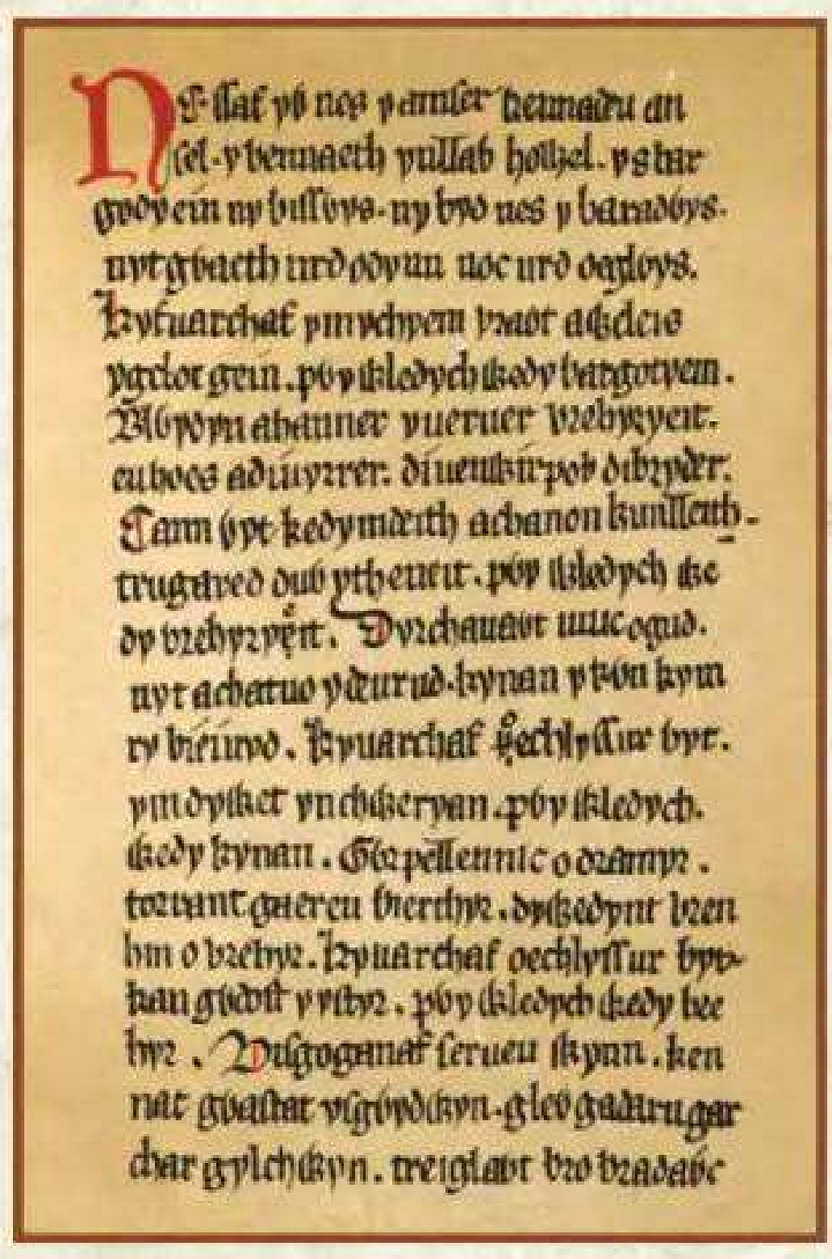
The first recorded autopsy takes place in Cremona, Italy, with dissections eventually becoming an educational tool in medical universities, such as the one in Bologna, over the next few decades.

REALDI COLVMBI CREMONENSIS,
In almo Gymnasio Romano Anatomici celeberrimi,
DE RE ANATOMICA LIBRI XV.
VENETIIS, Ex Typographia Nicolai Beuilacque, M D LIX.
CVM PRIVILEGIIS.

1286

NATURAL MEDICINE

The *Red Book of Hergest*, a Welsh Medieval manuscript, is created and it includes a collection of herbal remedies attributed to Rhiwallon Feddyg, the founder of the Physicians of Myddfai.



14TH CENTURY

IN HISTORY

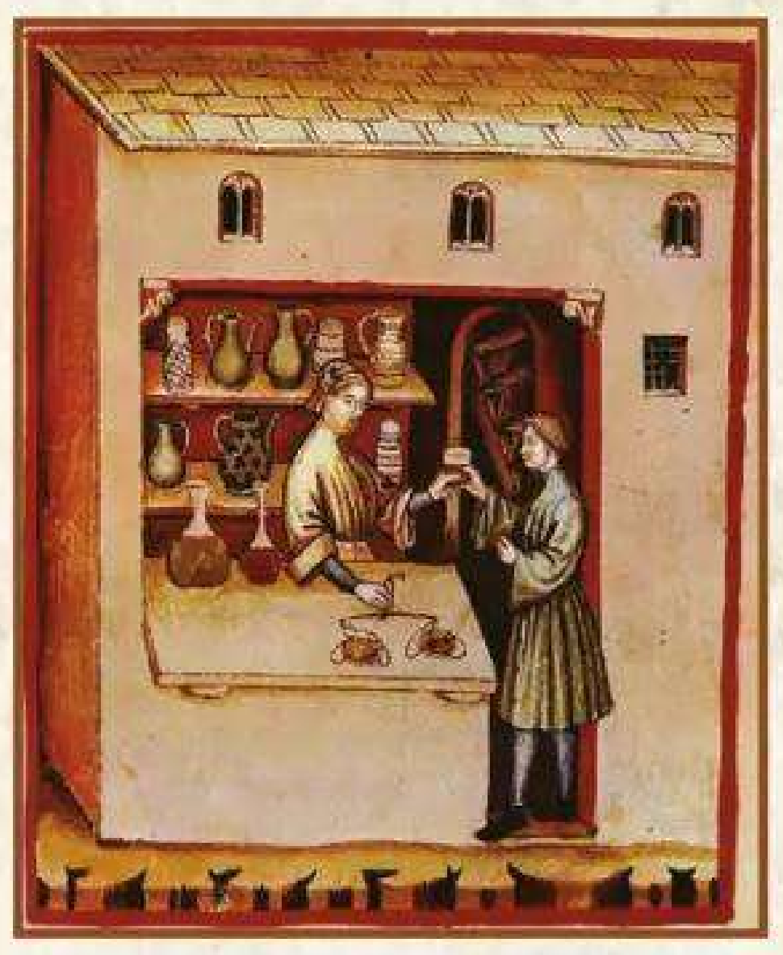
CHINESE MEDICINE

Chao Yuanfang, an imperial court physician during the Sui Dynasty, compiles his *Treatise On The Many Illnesses*. He discusses more than 1,700 diseases, such as smallpox, which greatly influences medicine in China.

610

ISLAMIC GOLDEN AGE

The first pharmacies are opened in Baghdad and they prove to be very popular, with many more founded throughout the Arab world – they would finally appear in Europe by the 12th century.



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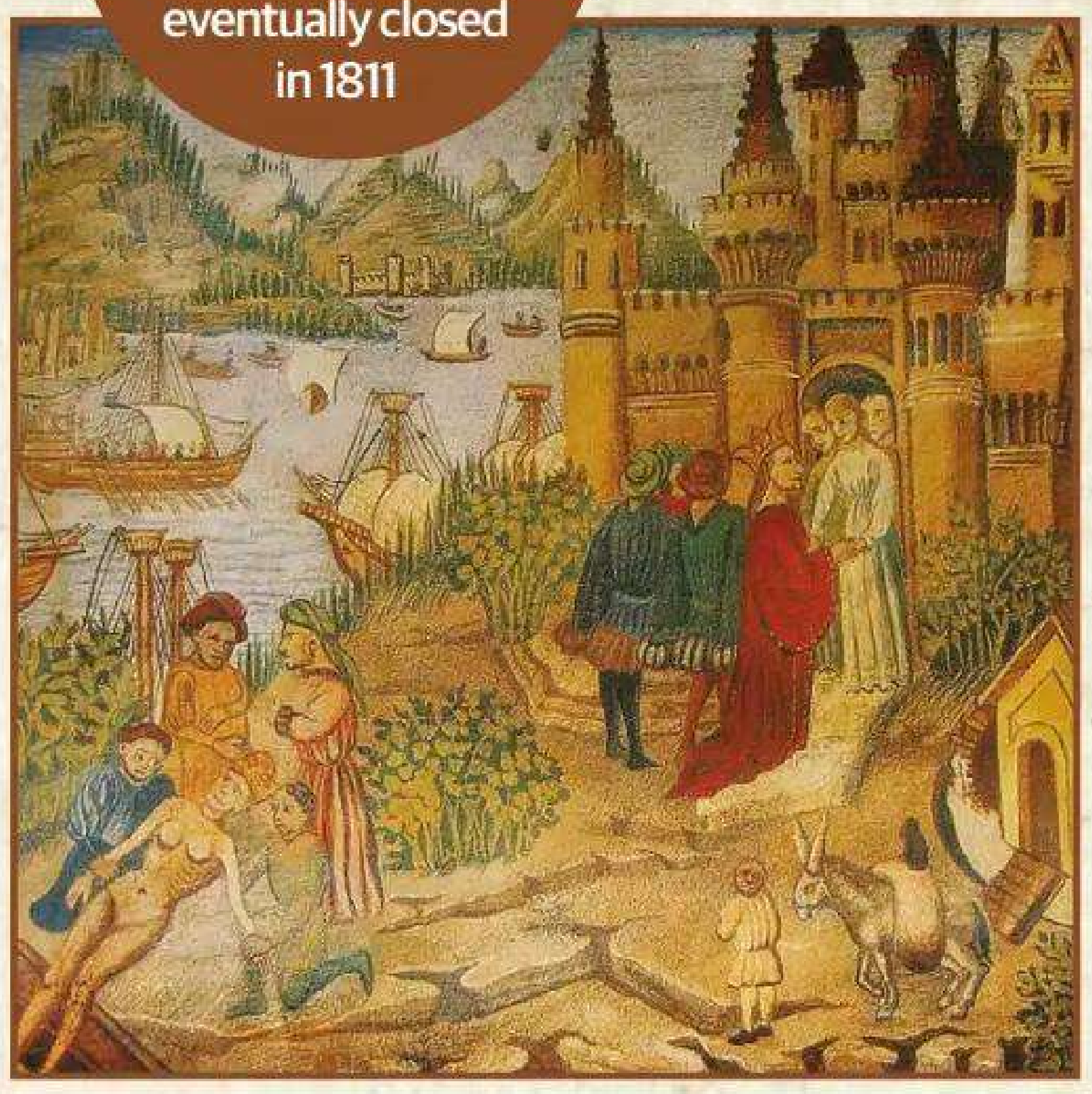
EMERGING EDUCATION

The Schola Medica Salernitana is founded in Salerno, southern Italy, and is believed to have been the first medical school of the Western medieval world.

The Salernitana was a renowned institution for medical education until it was eventually closed in 1811



9TH CENTURY

A GROUND-BREAKING DISCOVERY

Persian physician Rhazes becomes the first person to distinguish between smallpox and measles, recognising them as two different deadly diseases, and discussing their associated signs and symptoms.

Rhazes conducted an early example of a clinical trial, using one half of a group as a control in a menigitis study

910

JAPANESE MEDICINE

Physician Tamba Yasuyori completes his edit of *Ishinpō*, the oldest surviving medical text in Japan. Inspired by the work of Chao Yuanfang, it discusses both diseases and treatments and is considered a national treasure of Japan.

984

PUBLIC HEALTH

Infirmaries had been a part of monasteries since the 6th century but it takes another five centuries before public hospitals are opened, supported by the church, city authorities or through private funds.

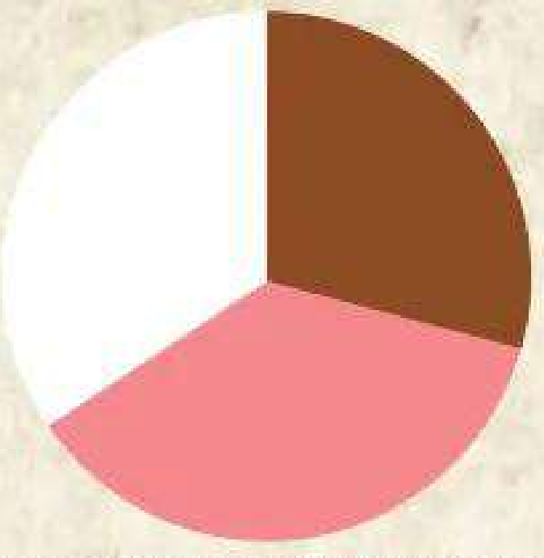
11TH CENTURY

THE BLACK DEATH

Estimates vary because of poor record keeping and it is unlikely that we will ever know how many people actually died

25-50 MILLION

Estimated number of people who died



That roughly equates to

30-60%

of Europe's population

It is thought the plague travelled anywhere between

1-8 MILES A DAY

1347-C.1352

A FATHER OF SURGERY

English surgeon John Arderne composes his influential medical treatise on a range of topics, including treatment for the eyes and a cure for anal fistulas, based on his career experience.

1370S

LIFE EXPECTANCY IN ENGLAND

21-year-old male aristocrat was estimated to live another **48.11** years between 1400 to 1500

This had risen from **24.44** years the previous century, due to the Black Death

Meanwhile, they had been expected to live another **43.14** years between 1200 to 1300

15TH CENTURY

Medieval doctors considered a number of factors about their patients before deciding on the best course of treatment

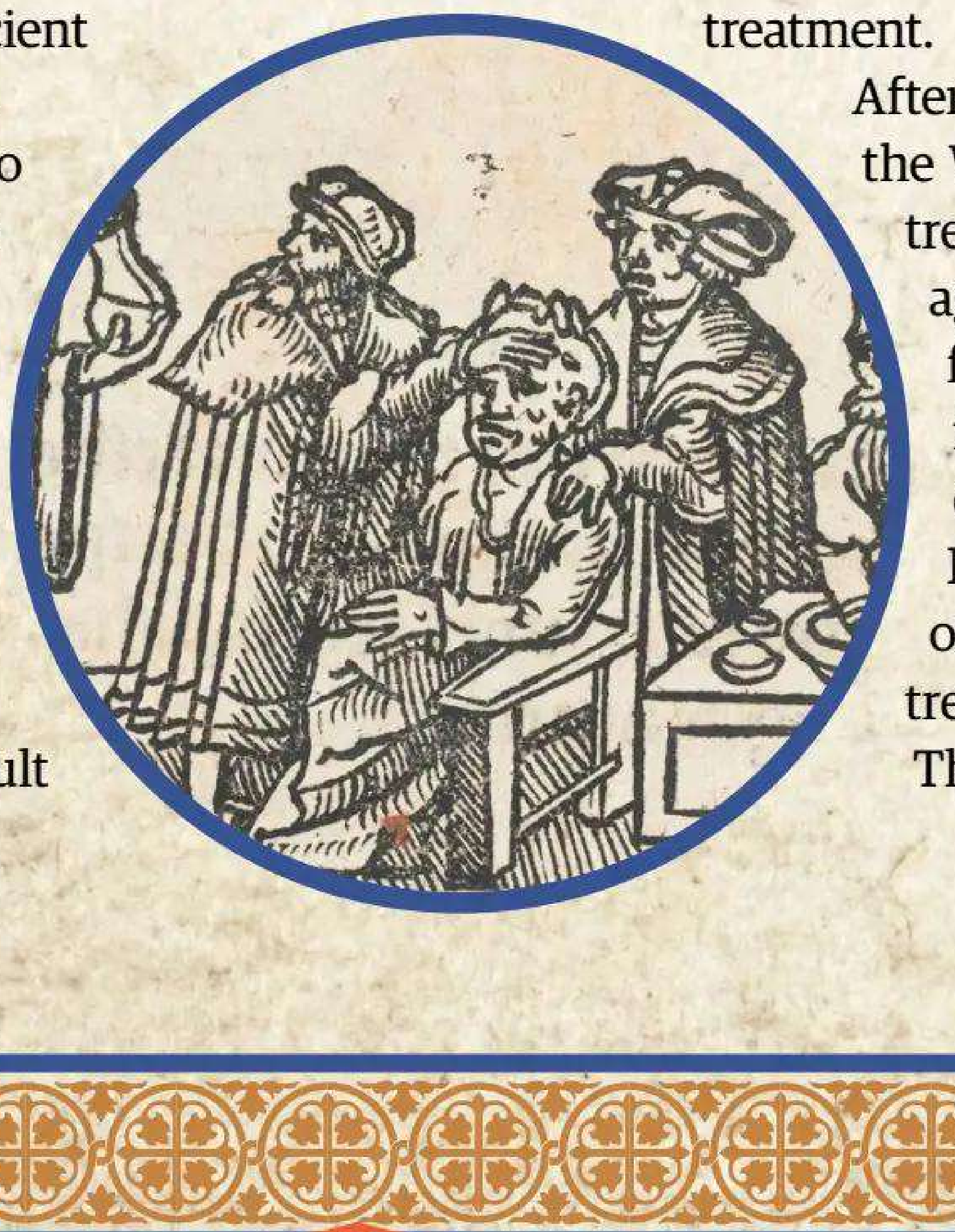
MEDICINE IN THE MEDIEVAL PERIOD

For medieval healers there were multiple methods of approaching illness they could apply to their patients

Words Ben Gazur

With all the wonders of modern medicine it is easy to look at medical practitioners of the medieval period as deluded quacks who relied on credulity and superstition. While it is true that many many people relied on treatments which would have done little to cure illnesses there was a great deal of study and theory which underpinned how many healers operated. Medieval doctors drew on ancient sources, the most modern thought, and empirical experience in their attempts to create a remedy – though some of these attempts strike us as bizarre.

The medieval period, or Middle Ages, lasted from the fall of the Western Roman Empire in the 5th century until around the 15th century. This millennium of European history includes a huge variation in lifestyle, nations, and knowledge. It can be difficult to speak of the medieval period as a single unit. The practice of medicine changed dramatically over this time.



ANCIENT ORIGINS

Medicine in the medieval era was heavily influenced by authorities who worked in ancient Greece and Rome. The Hippocratic texts, the works of Galen, and those of Pedanius Dioscorides were copied extensively in Western Europe and formed a nucleus of study for doctors. These texts gave a foundation of diagnosis, anatomy, surgery, and treatment.

After the collapse of the Roman Empire in the West there was a strong tendency to treat the fallen empire as a lost golden age. Sources of knowledge which came from ancient days were highly regarded, in many cases more so than practical experience. Antiquity lent authority. Doctors who could point to a Roman or Greek work as the basis for their treatments was more likely to be trusted. There were reasons to rely on ancient texts. The study of human anatomy in the medieval period was limited because of Church bans on the dissection of dead bodies. Most doctors would only have known anything about the internal organs of a person from reading about them in the works of ancient authors. There were downsides to trusting these texts. Galen seems never to have dissected a human and based his work on cutting up apes and believing the human body was exactly the same.

Perhaps the most influential ancient theory of medicine was the Hippocratic belief in the four humours: blood, phlegm, black bile, and yellow bile. Disorders could, it was thought, be explained by levels of these substances being out of balance in the body. For centuries doctors sought to cure patients by removing blood or giving medicines to provoke vomiting to redistribute the humours.

The textbooks of medicine used for most of the Middle Ages had to be copied repeatedly by hand if they were not to be lost forever. Most scribes were trained clerics and so many works were to be found in the libraries of monasteries. These became the nucleus of many of Europe's great schools of medicine.

CHRISTIAN INFLUENCE

It is impossible to comprehend medieval Europe without an appreciation of the power and influence of the Catholic church. This extended to acceptable medical training. Ancient writers were tolerated because their works did not contradict Catholic theology. Many in the church might think that illness was caused by God as a punishment for sin but they also allowed doctors to do their best to help. The early church father Origen had declared that doctors were appointed to minister to the sick by using the healing substances God in his wisdom had placed on the Earth.

Since many of the finest texts were found in monasteries it was natural that many of the best trained healers were found in monastic establishments. There was a theological reason too as to why many monasteries served as hospitals. The Holy Rule of St Benedict was followed in many abbeys and this told monks 'Before and above all things, care must be taken of the sick, that they be served in very truth as Christ is served; because He hath said, "I was sick and you visited Me"'. Special cells were set apart and the ill given dispensation to eat meat if it would help their recovery. Members of a religious order could become renowned for their healing skill, such as Hildegarde of Bingen.

> "MANY OF THE BEST TRAINED HEALERS WERE FOUND IN MONASTIC ESTABLISHMENTS"

Monasteries and nunneries grew much of their own food and so would have an extensive garden. Some of the space of the garden was given over medicinal plants such as herbs that could be used to treat illnesses. Aromatic herbs like rosemary and mint found a place both at the dining table and the sickbed.

Monks wore their hair in a tonsure where the top of their heads was shaved. Obviously they would need a barber for this and so there was someone associated with the monastery trained in handling sharp blades. Should a patient need to be bled this task was given to the barber and most surgical and dental tasks were also appointed to these barber-surgeons.

The relative wealth of monastic houses allowed them to purchase medical items and build facilities most people could not otherwise afford. Archaeological digs on British monasteries have revealed vessels for distilling medicines, drugs imported from the Mediterranean, and medical tools. In short a monastery could offer a patient both prayers and practical care.

SCHOOLS AND TRAINING

Monastic settings may have preserved much ancient knowledge but during the medieval period more secular centres of training also appeared. The schools of Salerno and Montpellier taught doctors from the ancient classics but also produced new medical treatises. Key to their success was access to Greek, Arabic, and Jewish learning which began to flow into Europe.

Established universities across the continent began to create their own medical schools where doctors could be trained. With training came codes about who could call themselves a doctor. In 1231 Frederick II, Holy Roman Emperor, decreed that all doctors must study logic for three years before undertaking five years of medical study. The doctor then had to pass a test to be granted a license to practice.

Doctors were expected to know the *Ars Medicinae* - The Art of Medicine - which was a textbook composed of ancient works on medical theory, diagnostics, and how to examine

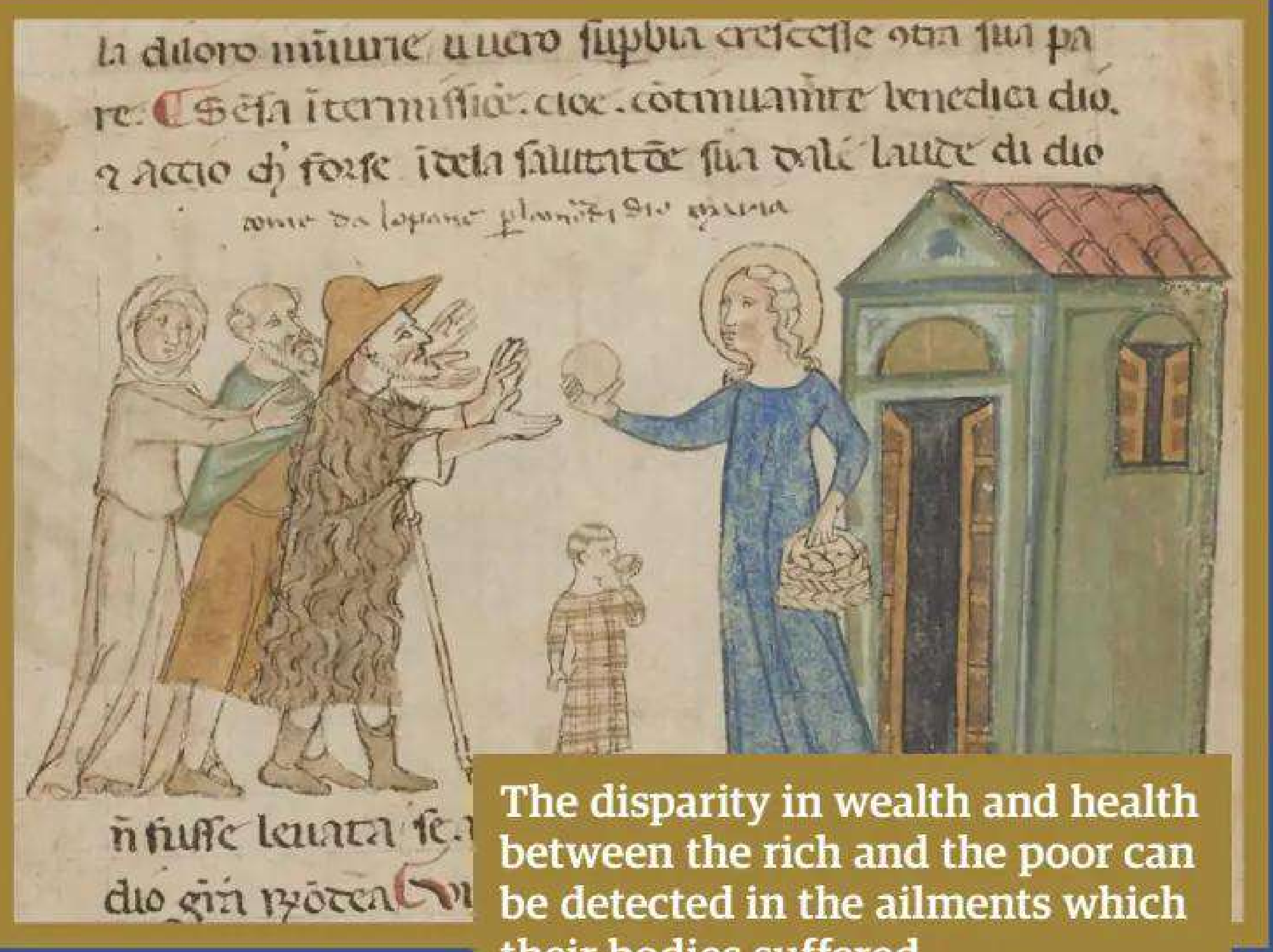
SERFS AND ROYALS

Lifestyle and wealth could affect overall health then as now

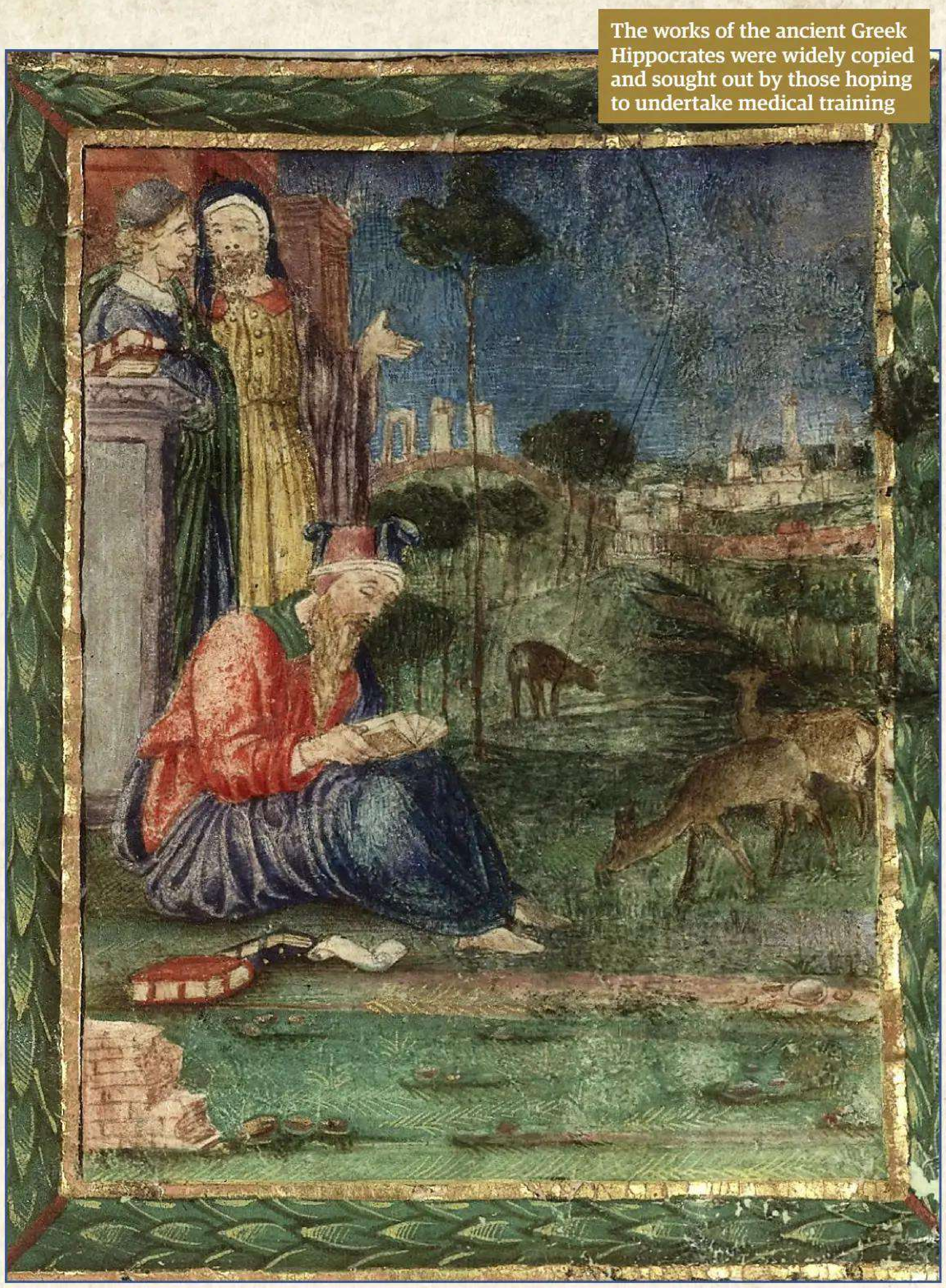
No one is immune to the dangers of ill health but social class certainly changes the sort of illnesses a person suffers from. The medieval world was one of strict hierarchy and feudalism which placed people in groups of greatly differing wealth and lifestyles.

Monarchs and nobility were spared the vigorous labour required to earn a living. Archaeological studies of teeth and skeletons, as well as written records, reveal that the wealthy ate a varied diet which contributed to health. Some may have overindulged in meats and cheeses but they were spared the dangers of famines. Wealthier people had greater access to hygiene, baths, and doctors.

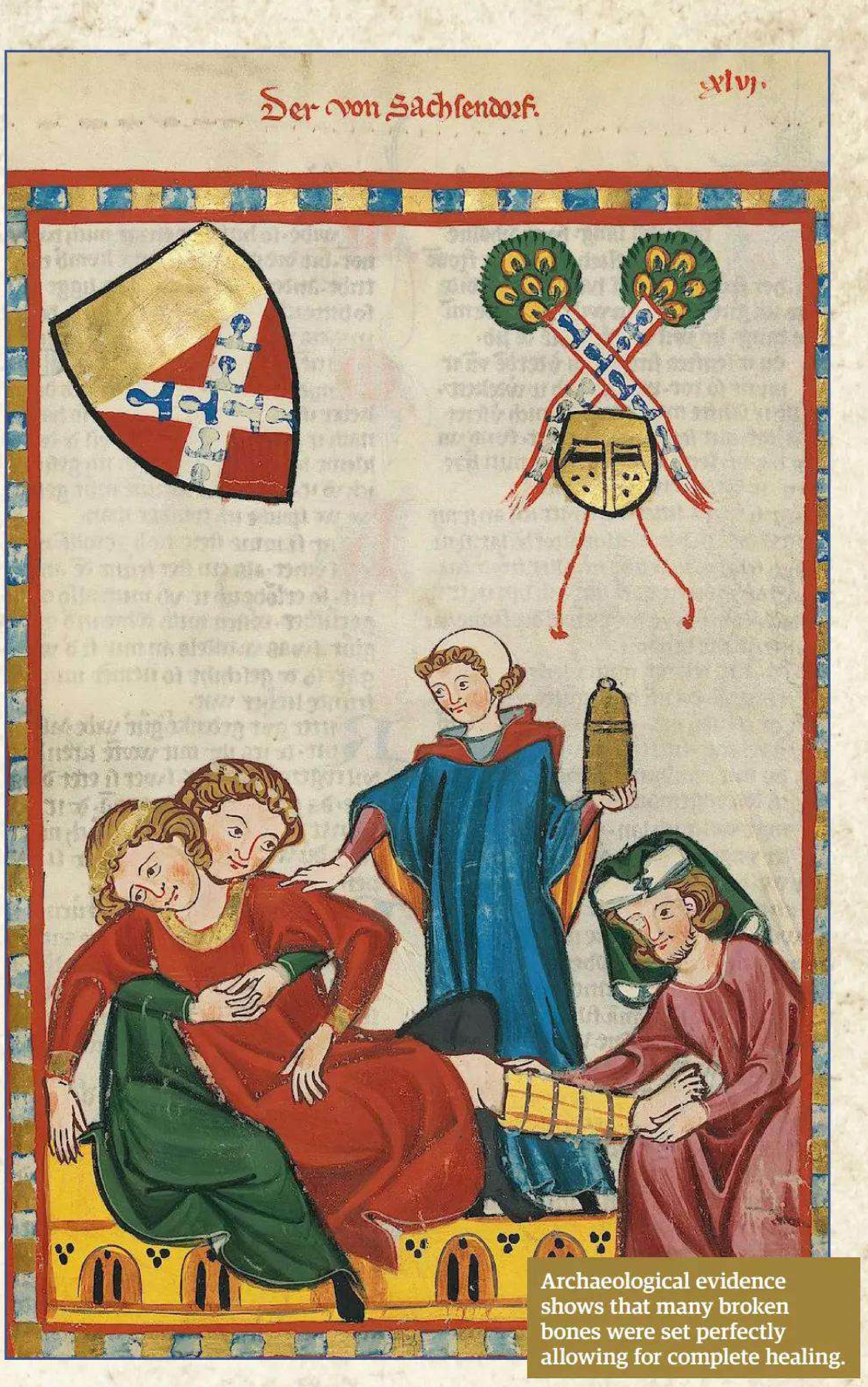
For those at the bottom of the social order life was often hungry and short. Their diet consisted mostly of grains and ale for the bulk of their calories. The coarse bread produced at the time tended to grind down their teeth. Signs of poor nutrition are often clearly seen in their skeletons and hard work on farms is also seen from the wear on joints. In times of lean harvests it was the poor who had to go without food. Cemeteries bear witness to the different health outcomes for the rich and the poor.



The disparity in wealth and health between the rich and the poor can be detected in the ailments which their bodies suffered



The works of the ancient Greek Hippocrates were widely copied and sought out by those hoping to undertake medical training



Archaeological evidence shows that many broken bones were set perfectly allowing for complete healing.

everything from a patient's urine to their pulse. Students of medicine attended lectures on this text and read learned commentaries on it. As more Arabic texts were translated into Latin they supplemented European medical knowledge. Ibn Sina, an Arabic scholar known as Avicenna, created a canon of medicine that was translated in the 12th century and became a standard text.

Medieval doctors were encouraged to treat their patients in a holistic fashion. Based on Galen's teaching they considered what were known as the six 'non naturals': air, diet, sleep, exercise, excretion, and emotion. These were factors that could create either health or illness and so needed to be examined before a treatment could be created for the patient.

Doctors with medical training were separate from barber-surgeons. Any illnesses that required an operation were passed from doctors to their colleagues who used blades. By the 14th century doctors were, on a limited basis, allowed to conduct occasional dissections and so began to have detailed anatomical training they could use for surgery. Some medical schools also demanded that students spend at least some of their time studying surgery.

Access to university-trained doctors however remained far out of reach for the majority of the population. The cost of calling in a doctor and buying the drugs they prescribed was simply too expensive. Fortunately there were alternative sources of help.

SUPERSTITION AND FOLK CURES

For those without access to a medically trained healer, most would have relied on traditional cures involving local plants. Bishop wort was thought to have over 50 uses from curing snake bites to preventing drunkenness. Garlic was used for constipation and dropsy (oedema). Some simple remedies would have been preserved within families but when special knowledge was known people sought out wise men and wise women – local healers with a working knowledge of herbalism and charms.

Charms and amulets were a familiar part of medieval life. Some charms were simple, such as hanging a stone with a hole in it to ward off witchcraft, while others were complex, such as written spells worn on the body. The idea of objects offering safety was natural in a world where saints' relics and images were thought to have healing properties.

Some members of a community could genuinely offer sound medical advice in times of need. Midwives were called on to help women during childbirth and their experience no doubt aided in many a dangerous labour. While in towns there may have been professional midwives, for women living in villages childbirth was guided by the older women of the family who had gone through its rigours themselves.

Medieval people should not be looked down on for seeking medical care in any of the forms it existed in at the time. Sickness causes desperation and they were doing the best they could with all the knowledge available to them at the time. Some of their remedies are effective, and still in use now.

MEDIEVAL HYGIENE

Dr Katherine Harvey reveals whether medieval people were really as dirty and smelly as we assume

IT IS USUALLY PRESUMED THAT MEDIEVAL PEOPLE WERE DIRTY AND THAT THEY DID NOT PRACTISE GOOD PERSONAL HYGIENE. IS THIS TRUE?

Definitely not! There is actually a surprising amount of evidence to show that medieval people not only washed but that they actively enjoyed doing so, and that they strongly disliked being dirty. Like us, they considered cleanliness to be good manners and they were well aware of the health risks posed by dirt. And so, even though practising good personal hygiene in a world without all our modern conveniences could be difficult and sometimes dangerous, most people washed often and did their very best to keep themselves, their clothes and their surroundings clean.

WHAT WAS THE MEDICAL ADVICE SURROUNDING HYGIENE DURING THE MEDIEVAL PERIOD?

Hygiene played a really important role in medieval medicine: physicians thought that regular washing was an important form of preventative medicine because it removed both visible dirt and invisible excretions (including sweat). If these were not washed off, they could cause all sorts of nasty problems, including skin conditions and parasitic infections. People were encouraged to wash their hands, face, mouth and head every morning when they got up, and to wash their hands throughout the day, especially before and after eating. Contrary to popular belief, medieval doctors were enthusiastic about bathing, both as a way to keep clean and as a way to treat illness. There were some concerns about excessive bathing, especially during epidemics (it was believed that heating the body opened the skin's pores to disease, and of course infection spread easily in crowded bathhouses). But, generally speaking, washing was very much seen as a good thing.

DR KATHERINE HARVEY is a medieval historian based at Birkbeck, University of London. She has published widely on medieval topics including sexuality, gender, emotions and the body, and is the author of *Episcopal Appointments in England, c.1214 – 1344* (Ashgate, 2014).

DID MEDIEVAL PEOPLE USE LUXURIOUS OR SCENTED PRODUCTS TO WASH THEIR BODIES AND HAIR?

Some of the ingredients used were a bit grim. The basic soap, for example, was made of wood ash and fat. Clothes were often washed with stale urine, which is actually a natural source of ammonia, so that is not as bad an idea as it sounds! But nice smells were strongly associated with cleanliness and good health, so many people would have added sweet-smelling herbs to their water; those who could afford it used expensive scented soaps and oils. Hair was washed with herbs mixed into the water, or with powders made of fragrant ingredients such as rose petals. And teeth were often cleaned with powders made of herbs such as mint, which of course we still use in toothpaste today.

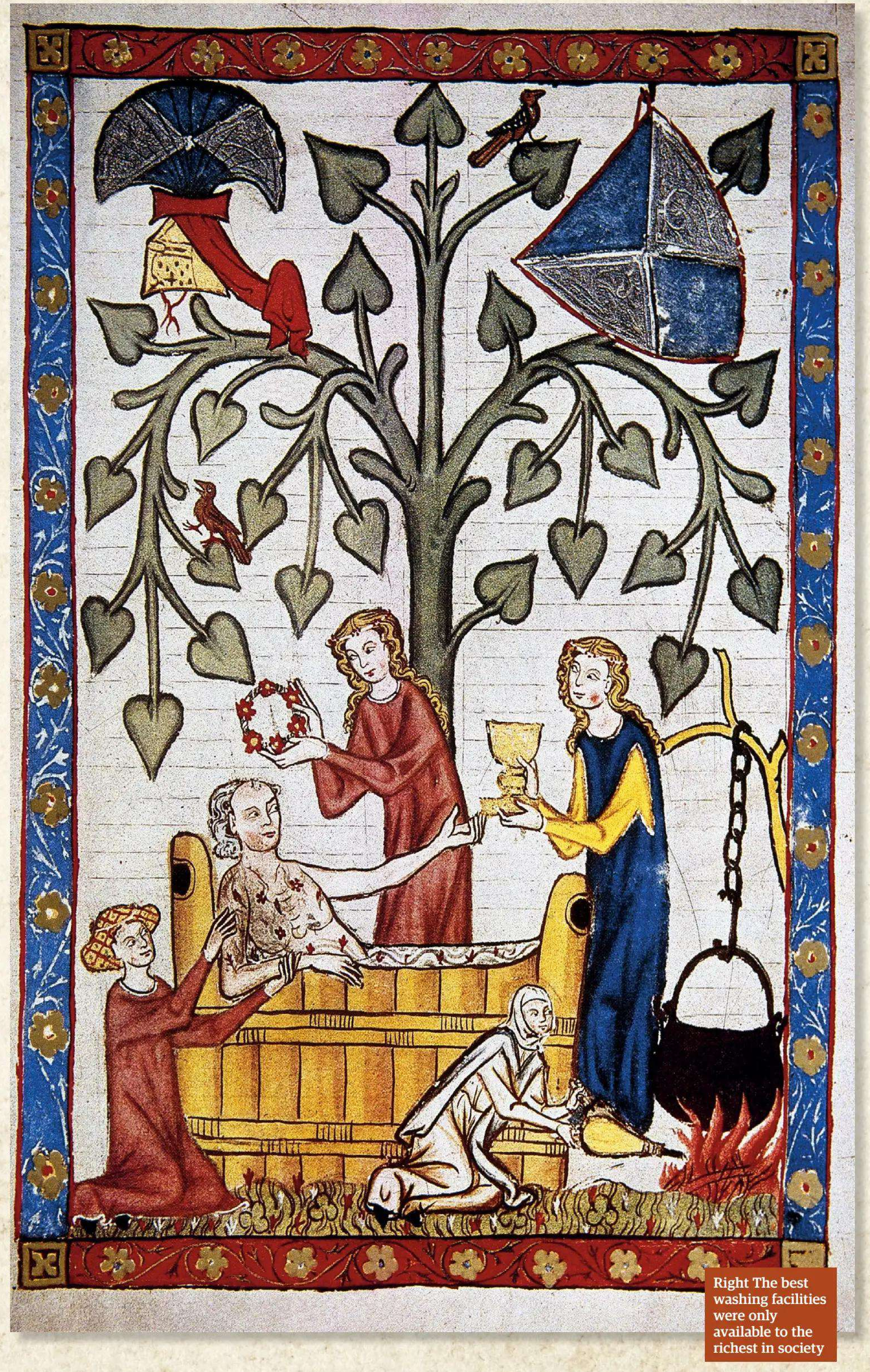
DID ANYONE LIVING IN MEDIEVAL SOCIETY WILLINGLY ADOPT POOR PERSONAL HYGIENE?

Yes, a few people. Some medieval Christians worried that taking good care of the body was a sign of vanity, especially if it was done to attract the opposite sex. The Italian mystic Catherine of Siena often wept when she recalled how, as a teenager, she had washed her face and brushed her hair in the hope of finding a husband. Poor personal hygiene, on the other hand, could be linked to piety, so some saints actively embraced filth. After Thomas Becket was murdered in Canterbury Cathedral, the monks who prepared his body for burial discovered that his hair underclothes were swarming with lice and fleas. They interpreted this as further proof of his sanctity, almost another form of martyrdom. But poor personal hygiene was never actually required of the clergy. In fact, they were early adopters of running water, washing and toilet facilities. Such behaviour was powerful because it was unusual, and most people would have been just as repulsed by parasites as we are!

WAS WASHING EQUIPMENT, SUCH AS BATHTUBS AND BASINS, AVAILABLE TO ALL LEVELS OF MEDIEVAL SOCIETY?

The best facilities, such as the bath-chamber with hot and cold running water which Edward III had in his palace at Westminster, was only available to the very richest people. But almost everyone had some washing equipment. Many

> "MOST PEOPLE WASHED OFTEN AND DID THEIR VERY BEST TO KEEP CLEAN"



Right The best washing facilities were only available to the richest in society

A small boy having his head cleaned of lice

people owned a wooden bathtub; these were often lined with cloth to prevent splinters, and were filled with water heated over the fire. We know from post-mortem inventories that even peasants usually owned basins and ewers for washing. Town-dwellers could also go to the public baths (there were more than 30 such establishments in early 13th century Paris), and we know that many people washed in rivers, lakes and ponds. Sadly, our best source of evidence for such outdoor washing are coroners' records, which include numerous cases in which people drowned while bathing.

HOW DID MEDIEVAL PEOPLE WASH THEIR CLOTHES? AND DID THEY DO THEIR LAUNDRY OFTEN?

Some women (and it almost always was women) used a tub in which they would trample their linen or beat it with a wooden bat until it was clean. Others did their washing in rivers and streams – larger rivers often had special jetties to facilitate this. Washing was dried outside, preferably on bushes or on freshly cut grass to make it smell nice. Most people washed quite often, and records from wealthier households suggest that at least some people changed their underclothes (usually a linen shift) every day. Hospital regulations usually stated that the patients' linen must be washed at least once a week, and more often if necessary. Monks and nuns were prone to complain if their laundry wasn't done at least once a fortnight. But for the very poorest members of society, who owned only a single set of clothes, doing the laundry may have been a rare treat.

© Getty Images

MUCKY MIDDLE AGES

The Middle Ages were filthy, dirty and disgusting. At least that's how they show it in the movies, so it must be true...

Words Edoardo Albert

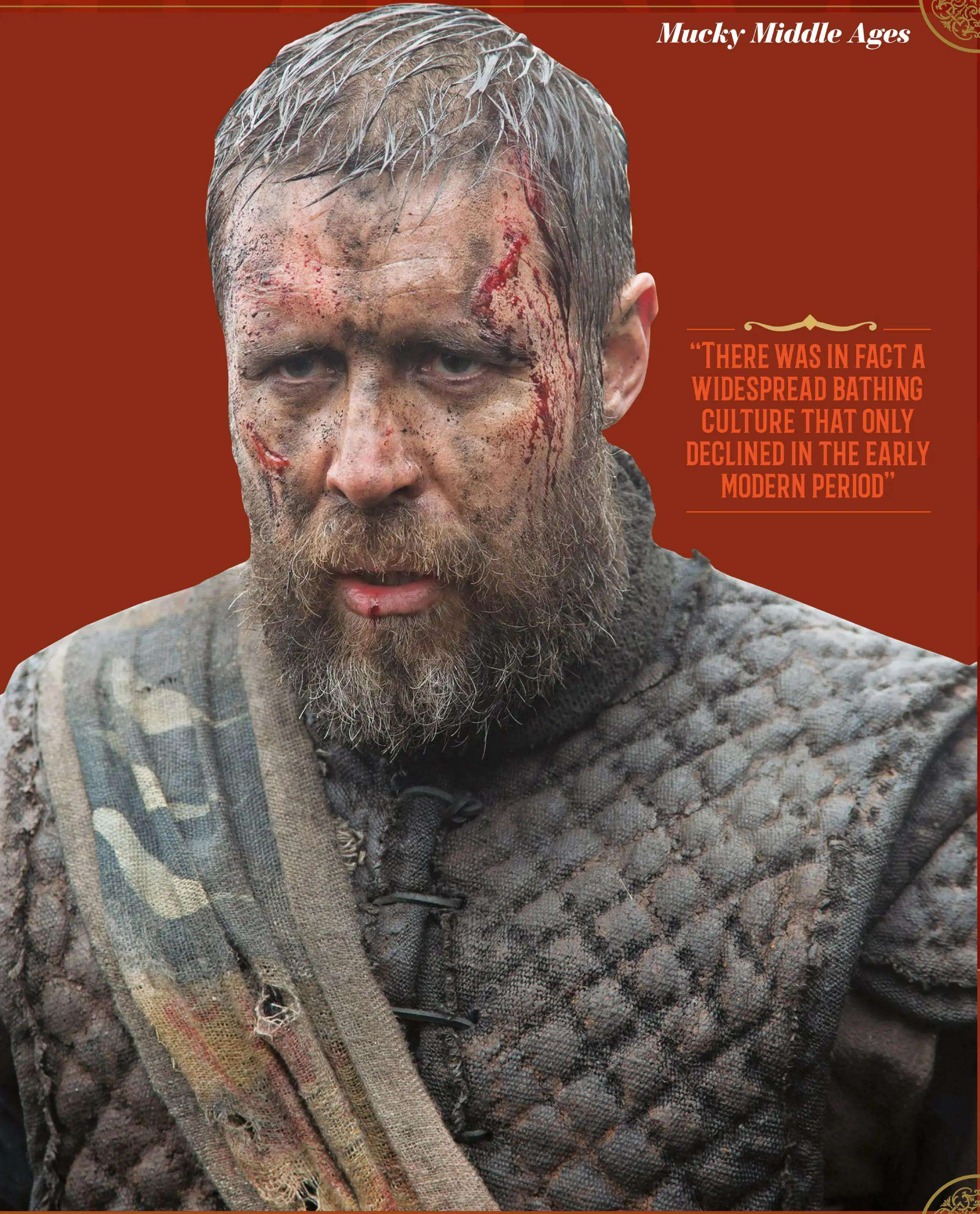
It turns out that the movies are wrong. In fact, pretty well everything in the movie versions of the Middle Ages is wrong. Watching films like *Kingdom of Heaven* or *The Name of the Rose* you would think that everyone in those times dressed in nothing but dull browns and greys, that you couldn't walk down the street without someone emptying a chamber pot over your head and that people never ever washed.

All of that is wrong. Let's start with colour. Rather than a drab world of browns and greys, medieval people loved colour, and the brighter the better. The rich wore clothes of quite startling hues and even poor people in the countryside dyed their clothes, with natural dyes obtained from plants, into bright colours. Buildings were brightly painted too, outside and particularly within; even the statues were painted in vivid shades. Far from being dull brown, the Middle Ages were vibrant and alive. If we could travel back in time to the medieval era, we'd find it more Disney than drab.

Okay, you might say, even if it was a lot more colourful than in the movies, we know it was a time of dirt and disease. After all, the average lifespan was about 35. People started having children when they were just out of puberty, in their early teens, and then most of them died before they'd even got to 40.

Again, this is mostly completely wrong. The average life expectancy was indeed low but this was almost entirely due to the very high rates of infant mortality: something like half of the babies born made it to age five. But those children that survived then had a very reasonable chance of living to a good age. Not only that, but people did not normally marry in their early teens. Parish marriage records, which go back a long way, show that the average age at marriage was the early 20s for women and the mid to late 20 for men. There were two reasons for this. The first was that the prospective spouse had to demonstrate that he could support his fiancée, which meant that he had to have a stable profession, which required him to be a fully fledged adult. The second reason was that people entered puberty later then than now, with many children only hitting puberty in their mid to late teens. While princesses were occasionally married while still children, these were dynastic marriages that were not consummated until the girl was a woman. Among the ordinary people, marriages occurred well after puberty.

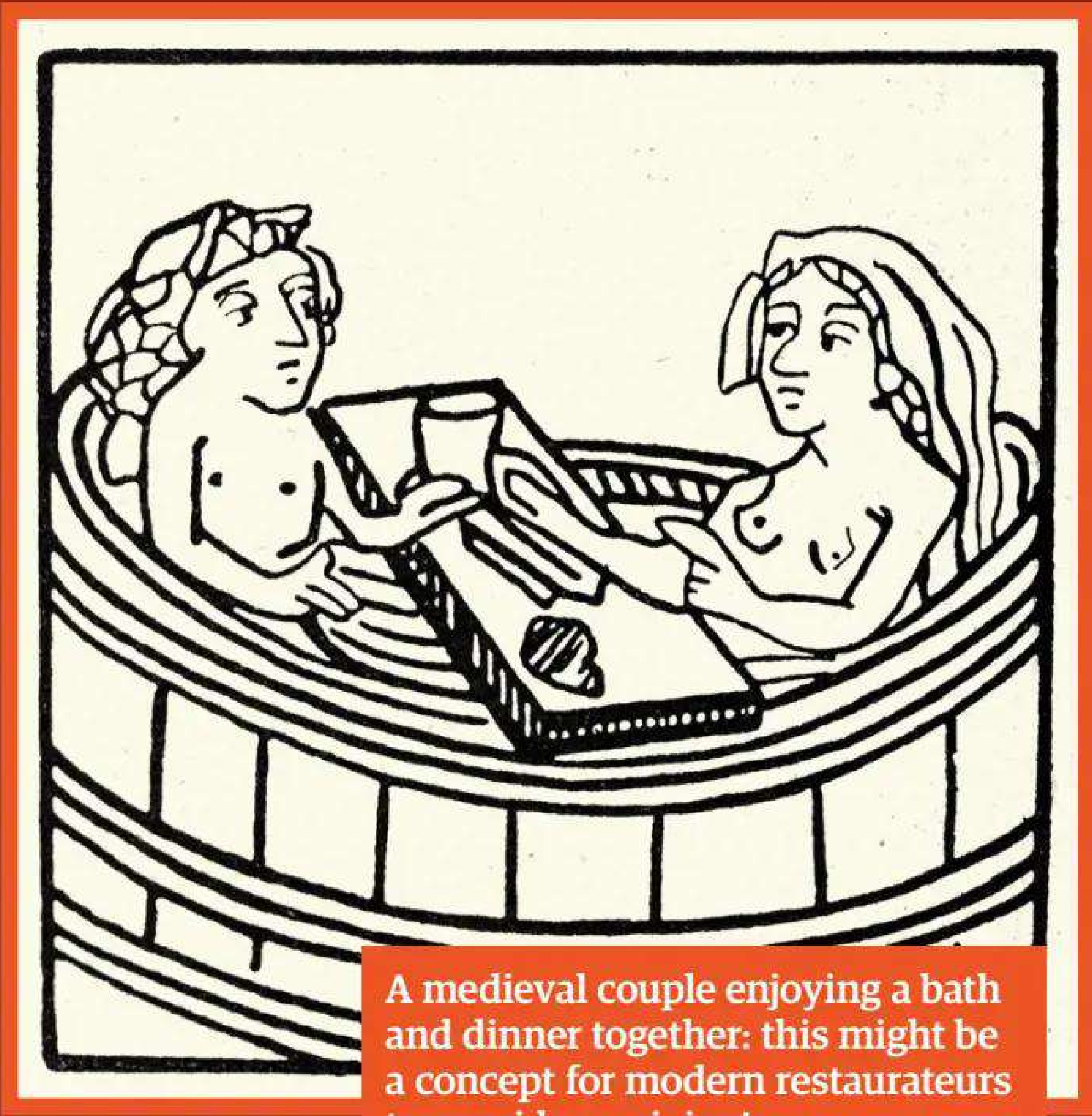
As to having to dodge the contents of chamber pots emptied out of upstairs windows when walking



> "THERE WAS IN FACT A WIDESPREAD BATHING CULTURE THAT ONLY DECLINED IN THE EARLY MODERN PERIOD"

People needed to eat, but regulating medieval butchers to prevent piles of entrails and offal building up in the streets was a major concern of city authorities

What people think you would have had to dodge in medieval cities



A medieval couple enjoying a bath and dinner together: this might be a concept for modern restaurateurs to consider reviving!

the streets of a medieval town or city, we have on record strict ordinances promulgated by city authorities throughout Europe forbidding the emptying of waste into the street. Of course, that there were laws against this shows that it did sometimes happen, but the fines were considerable and, records show, sometimes imposed, so householders generally made other arrangements. They had reason to do so besides fines: there was money to be made from poo. One of the better paid but more noisome jobs of the medieval era was that of the night soil collector, who went from house to house gathering the contents of chamber pots. Because of the smell associated with the job, night soil collectors were only allowed to work during the hours of darkness, typically between 9pm and 5am. They transported the collected waste to sites outside the town where it could be used as fertilizer on fields or disposed of into rivers.

Night soil collectors were only allowed to work during the night because of the noxious smell associated with their work. Although medieval medicine had little concept of the idea of infectious diseases, what it did have was a strong idea that disease was associated with breathing in bad air - or miasma as it was called. The most common sources of bad smells in medieval towns and cities were human waste, which was generally collected and disposed of, and the smells associated with certain jobs, in particular butchery and tanning.

Medieval people, and in particular the civil authorities, were very concerned to legislate against practices that could produce stinking piles of refuse in the streets that in their turn produced the bad air that led to disease. As such, the laws of many medieval cities are full of ordinances against butchers disposing of offal and entrails in the street outside their shops, and the slaughter of animals in the street. Again, the fact that these laws exist show that these practices did occur, but that they were legislated against shows that the public authorities did whatever they could to forbid them.

Another major contributor to rubbish in the streets was animal excrement. Even in cities, people lived alongside animals in a way that is difficult to imagine today. Animals were the major forms of transport, both of people and goods, with riders and carts filling the streets. There was no refrigerated transport either, so the meat that was sold at butchers had to be herded into the town or city where it was slaughtered, resulting in droves of animals regularly making their way through the streets. All this produced large amounts of ordure. To combat this, medieval towns and cities employed street cleaners, whose job was to sweep up animal excrement and remove it from the city to fields where it was used as fertilizer.

But if was not just animals that polluted the streets. People did so too, if they were caught short between home and wherever they were going. But urinating in public met with disapproval from bystanders. In 1307, two Londoners challenged one of the King's Grooms, who was relieving himself on the street, telling him that he should be using one of the public privies instead. The King's Groom, unused to being spoken to in this manner by commoners, took umbrage and the dispute turned into a fight which found its way into the courts, which is why we know about it today.

The bystanders were making a reasonable point though. In London, there were public latrines. The first public toilets were built on bridges over rivers, the Thames in London, the Ouse in York, so that the waste would go directly into the water and wash away. In fact, the records of medieval towns almost all show in their accounts money set aside to maintain public toilets. So the King's Groom really had no excuse for relieving himself in the street. As medieval concerns over polluted watercourses grew, public latrines were moved to different locations and regularly emptied by the night-soil collectors.

As for personal cleanliness, the idea that people did not bathe in the Middle Ages is a myth. There was a widespread bathing culture, in Britain and throughout Europe, that only declined in the early modern period when doctors started spreading the idea that diseases could get into the body through water. The truly filthy centuries were the 17th and 18th centuries, an era when the Palace of Versailles was built without toilets and people covered up bodily smells with perfumes and nosegays. By comparison, the Middle Ages were positively clean. For instance, King John took a bathtub with him when travelling around the country so that he could have a bath and employed a servant whose job was to prepare his bath. While only the rich could afford personal baths, everyone else could repair to the many public bath houses that were established in medieval towns and cities: Paris had over 30. An English visitor complained of being woken by their proprietors crying out in the street that the water was hot and the baths were ready. In London, bath houses were mainly located in Southwark, along with the playhouses and bawdy houses: taking a bath was seen as something of a pleasure. Indeed, bath houses were a European phenomenon, with bathing often combined with other pleasures. Etchings of German bath houses depict couples sitting in their bath tub sharing a hot meal as well as the hot water.

The decline in public bath houses was precipitous and it came about in part because of the association of bath houses with various forms of pleasure. The great humanist writer, Erasmus, wrote in 1526 that, "Twenty-five years ago, nothing was more fashionable in Brabant than the public baths. Today there are none, the new plague has taught us to avoid them." The new plague he was referring to was syphilis. The association between bath houses, sex and syphilis saw the end of public bath houses and two centuries of dreadful personal hygiene in Europe.

"THE FIRST PUBLIC LATRINES WERE BUILT ON BRIDGES OVER RIVERS LIKE THE THAMES"

These are the sorts of colourful clothes medieval people actually wore

FORTY DAYS OF QUARANTINE

We have medieval Dubrovnik to thank for modern lockdowns

The word 'quarantine' comes from the Italian for 40, quaranta. The idea was popularised in the various Italian city states but the first quarantine measures were actually introduced on the other side of the Adriatic Sea, in the city of Dubrovnik. There, on 27 July 1377, the city council met to discuss measures to deal with the plague that was spreading throughout Europe. They designated a small island near the city where all visitors coming to the city had to remain for a month before being allowed further contact. Furthermore, anyone from Dubrovnik visiting the island would also have to stay there for a month too.

It was a quarantine in all but the 40 days that would be introduced by Italian cities that later adopted similar measures in their efforts to stop the spread of the plague. The idea of quarantine implied a concept of the incubation period for a disease and even that apparently healthy people might spread the infection. To enforce quarantine, the city officials in Dubrovnik established an office, the Officials Against those Arriving from Plague-Infected Areas, whose job it was to ensure that people observed the quarantine regulations as well as punishing anyone who broke quarantine. These measures allowed Dubrovnik to escape relatively unscathed from the plague. Seeing its success, Italian cities followed suit, many insisting on 40 days of isolation, thus introducing the term quarantine to the world.

Quarantine might be a medieval concept but we know all too well that we still use it in the modern world

MEDIEVAL MD

Have you been feeling under the weather lately? Consult our new medical dictionary for some of the best medieval treatments out there!

Words Jessica Leggett

The medical knowledge and understanding of the human body in medieval Europe was very different compared to what we know today. It was largely based on the practices set out by physicians, in particular Hippocrates and Galen, during the ancient world and the belief that the body comprised of four humours: blood, yellow bile, black bile and phlegm - with illness occurring when they became out of balance. Each humour corresponded to one of the four elements and its associated qualities, and so blood was like air, hot and wet; yellow bile was like fire, hot and dry; black bile was like earth, cold and dry; and phlegm was like water, wet and cold. Cures often revolved around these qualities, so if a disease was considered to be cold and wet, then something hot and dry would be recommended to counteract its symptoms.

Contrary to popular myth, dissections did occur during the medieval era but they were rare and so the inner workings of the human body were not fully understood. For medieval physicians, diagnosis was determined on the appearance of the patient and observation of the symptoms, in particular measuring the pulse and analysing urine. Numerous surviving manuscripts depict charts that showed physicians how to examine urine based on its colour, smell and even taste. Treatment fell into three categories - diet, medication and surgery - which still remain today, but some of the cures featured in this list are very bizarre and we don't endorse them, nor recommend that you try them!

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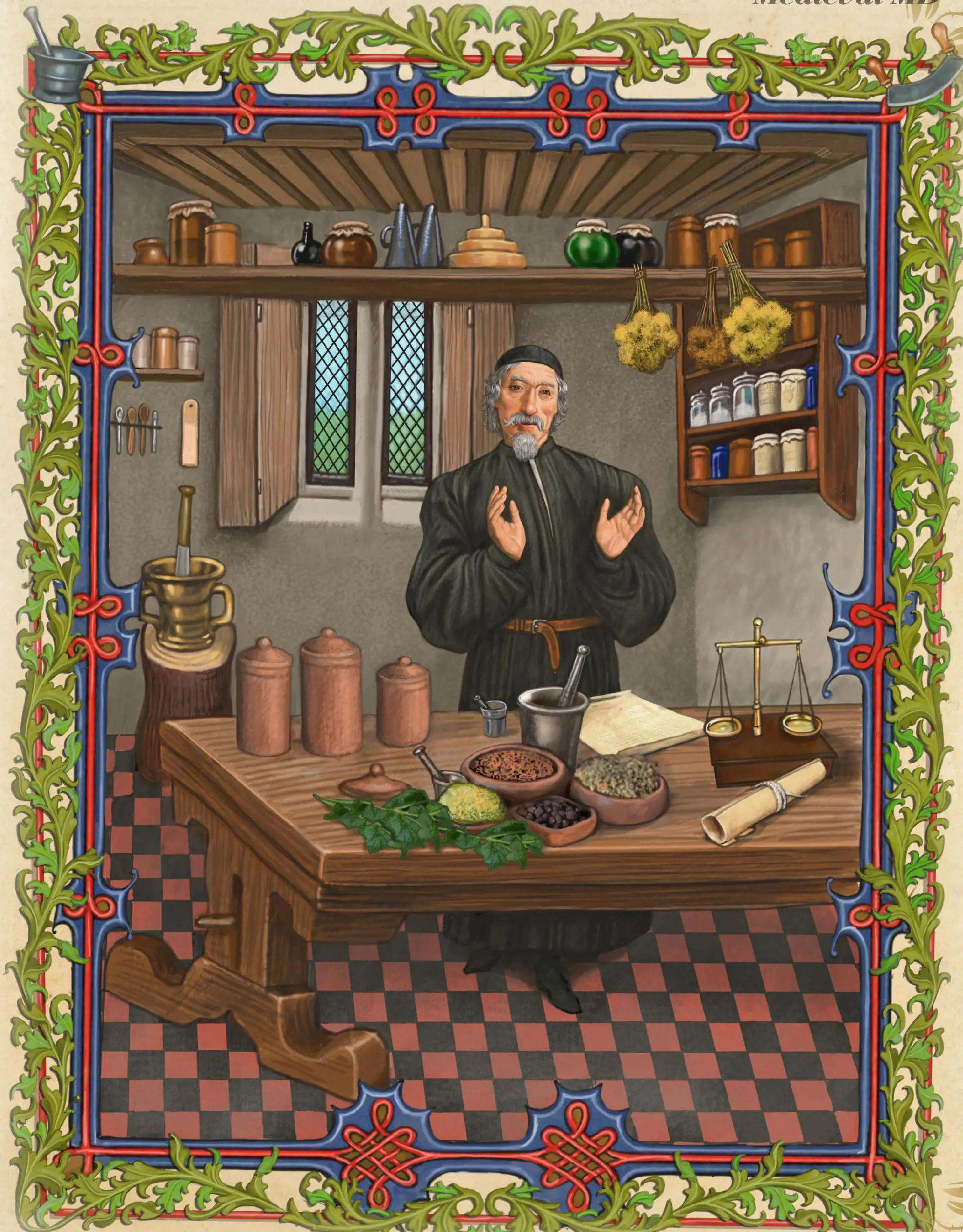

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WOUNDS AND BURNS

MEDIEVAL DIAGNOSIS: MINOR INJURIES
RECOMMENDED TREATMENT: SPIDER WEBS

From time to time everybody experiences a wound or burn that they need to treat, and with no modern-day plasters to be found people in the medieval period would often use spider webs – sometimes soaked in oil and vinegar – to cover them. Spider webs were an ideal choice because they are naturally antiseptic and once they had dried they would form a hard protective layer on the injured area. Snail essence, which is packed full of anti-inflammatory properties, was also used to soothe burns and scalds and was even used as a sore throat remedy! Fresh urine was also used to cleanse wounds and burns because it was sterile, and it could sometimes be purchased from the local apothecary.

SECOND OPINION

There were many ways to treat wounds and burns during the medieval era, so if you're scared of spiders or snails then you may want to try a different route! Topical treatments that were frequently used included theriac and dragon's blood (actually a plant resin), but if the wound was bleeding a lot then some horse dung was applied instead. An ancient Egyptian treatment that continued into the medieval period was to use mouldy bread to treat wounds, which is fascinating considering that the antibiotic penicillin – discovered by Sir Alexander Fleming in 1928 – is derived from penicillium moulds.

EYE ISSUES

MEDIEVAL DIAGNOSIS: CATARACTS
RECOMMENDED TREATMENT: NEEDLES

Most people experience problems with their eyes at some point in their life and this was no different in the medieval period. Just like today, cataracts were dealt with through surgery, with physicians using a needle to remove the cloudy lens from the eye, a procedure that was known as 'couching'. It was a difficult operation that only the most highly skilled surgeons would perform and, overall, only external surgeries were carried out during this era. For those with swollen eyes, a recipe from Anglo-Saxon manuscript *Bald's Leechbook* recommended to take a live crab, cut off its eyes and hang them around the patient's neck.

SECOND OPINION

Another remedy for eye infections from Bald's Leechbook, which doesn't involve cutting up live crabs, was to create a salve from onion or leek, garlic, cow bile and wine. After the mixture had been left to sit in a brass vessel for nine days, it could then be applied to the affected eye with a feather. In recent years, researchers have remade this particular salve using the exact recipe from the Leechbook and discovered that it actually kills MRSA bacteria, leading to hopes that it may hold the key to dealing with antibiotic-resistant bugs.

EPILEPTIC FITS

MEDIEVAL DIAGNOSIS: THE FALLING SICKNESS
RECOMMENDED TREATMENT: ST PAUL'S POTION

As you can probably tell from this list, herbal medicines were all the rage during the medieval period and they were used for all manner of illnesses and conditions, including epilepsy. If you suffer from epilepsy, then a medieval physician would recommend that you drink St Paul's potion, which was attributed to the apostle himself. It was made from dozens of different ingredients including ginger, roses, cloves, mandrake, dragon's blood, liquorice, sage and roses all mixed together with honey and given alongside some wine. It was also a versatile medicine that could be used for stomach issues, paralysis and arthritis, but don't worry if you can't find all of the ingredients at your apothecary – there's always bloodletting!

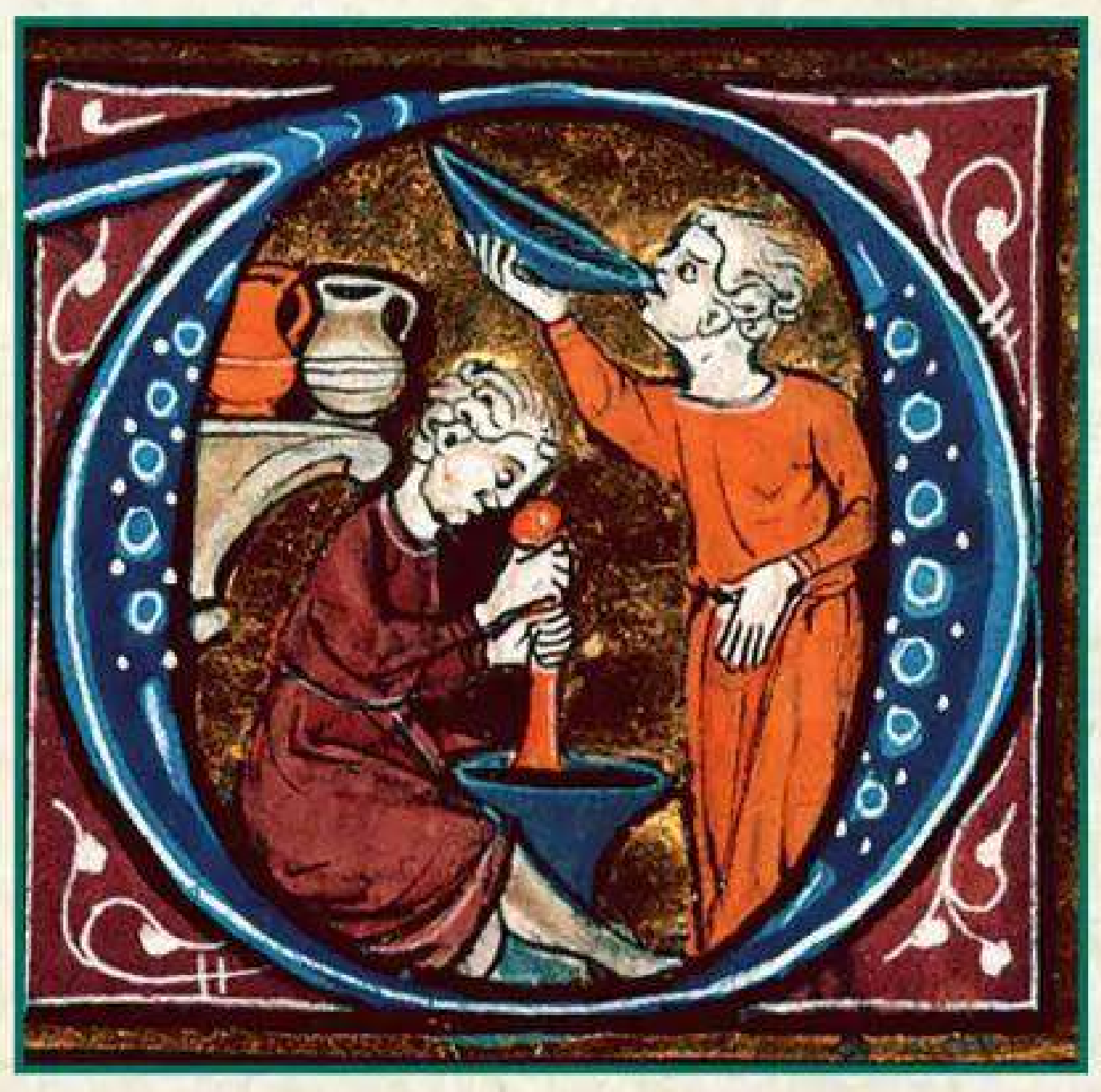

Image source: wiki/Avicenna

SECOND OPINION

While epilepsy is a common condition that is well understood today and can be successfully treated or controlled, its causes were not known during the medieval period. Consequently, it was assumed by many to be the result of demonic possession, with physicians performing trepanation on afflicted patients in an attempt to release the evil demon inside the body. Stemming from this superstition, magic and charms were also used to treat epilepsy and examples of them can be found in manuscripts from throughout the medieval period.

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FEVER AND UPSET STOMACH

MEDIEVAL DIAGNOSIS: IMBALANCED HUMOURS
RECOMMENDED TREATMENT: DRAGON'S BLOOD

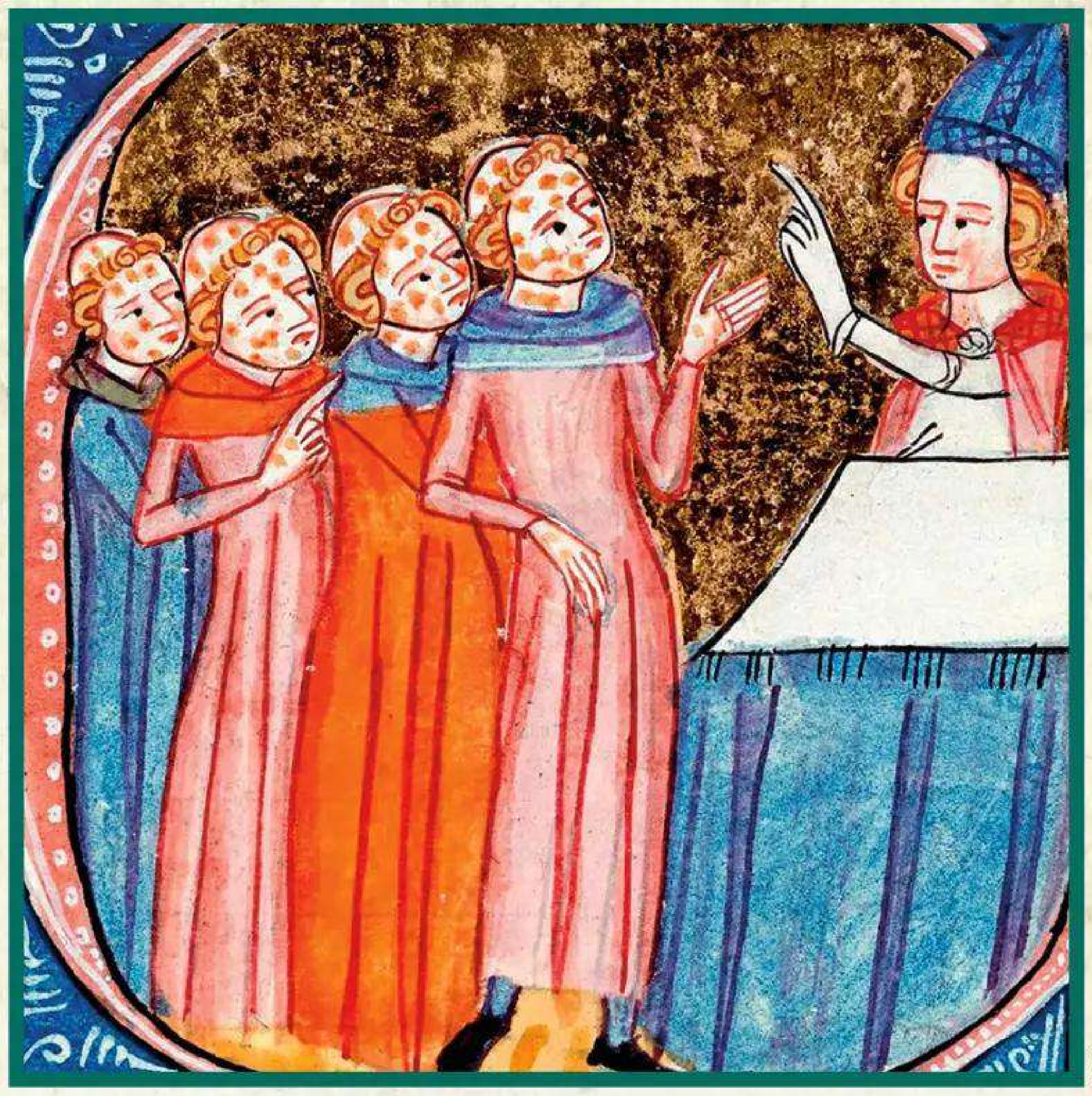
If you have a fever or an upset stomach - or both - then there are many medieval treatments that can deal with them. Dragon's blood, a sap from the Dracaena draco tree that was native to Morocco and the Canary Islands, was a popular medicine to drink. Blood red in colour, dragon's blood was prescribed for fevers, upset stomachs and even pain and heavy bleeding caused by menstruation. However, it was a very expensive ingredient and only the wealthy could afford it. Not to worry, though, another treatment for fevers and stomach problems was bloodletting, which restored balance to the humours.

SECOND OPINION

Just in case you can't get your hands on dragon's blood or you want to avoid bloodletting, you can always try one of the many medieval herbal remedies that were prescribed for fevers and stomach problems. Popular ingredients included galingale, powdered ginger or mint mixed with either wine or ale. Both ginger and mint tea are still recommended today for settling an upset stomach, promoting digestion and helping with a fever, so it seems that not all medieval medicine was on the crazy side!

RASH AND FEVER

MEDIEVAL DIAGNOSIS: SMALLPOX
RECOMMENDED TREATMENT: 'RED THERAPY'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Have you been suffering with a high fever, headaches, fatigue and vomiting, with lesions appearing all over your body, turning into blisters? It sounds like you've contracted smallpox, a nasty and contagious disease, but don't worry – a bit of red therapy should sort you out! In the medieval period it was believed that the colour red had healing properties, so patients with smallpox would be wrapped in red cloth and their bedchambers draped with red hangings, and they would only drink red fluids such as pomegranate juice and red wine. In some cases, even red implements were used by physicians as part of the treatment, which was adopted in Europe following the suggestion of Persian physician Rhazes in 910. The English physician John of Gaddesden used red therapy to treat Prince John, the son of King Edward II, which he wrote about in his textbook *Rosa Medicinae*. Red therapy persisted as a treatment for smallpox for centuries, and even Queen Elizabeth I was treated with it during her battle with the disease in 1562. If you're lucky enough to survive your bout of smallpox then don't worry, you will be immune to the disease for the rest of your life!

© Getty Images

HEADACHES

MEDIEVAL DIAGNOSIS: PRESSURE BUILD-UP
RECOMMENDED TREATMENT: TREPANNING

Do you have a headache or a migraine that just won't go away? In the medieval period, a popular treatment to alleviate the pain was trepanning, a procedure in which a hole was drilled into the head to relieve pressure. In reality, trepanning exposed brain tissue and the resulting wound would often become infected, ultimately leading to death. Another invasive method was suggested by Arabic physician Abu al-Qasim, which involved making an incision in the temple and sticking a piece of garlic inside it for 15 hours. Remove the garlic and leave the wound alone for two to three days and then apply some cotton soaked in butter. Once the wound develops some pus, take a red hot iron and cauterise your head.

SECOND OPINION

If you don't like the sound of having a hole drilled into your head, then there are plenty of other weird medieval treatments to cure your headache! For example, Ali ibn Isa al-Kahhal, an Arabic physician between the 10th and 11th centuries, suggested that you should tie a dead mole to your head in order to cure a headache. For a herbal alternative, one Anglo-Saxon recipe from Bald's Leechbook recommended mixing beetroot and honey and applying the juice on your head, before lying back in the sun and allowing the juice to run down your face.

LESIONS AND NUMBNESS

MEDIEVAL DIAGNOSIS: LEPROSY
RECOMMENDED TREATMENT: TREACLE

Have you had to leave your home and move into a leper house or hospital after being diagnosed with dreaded leprosy? Well, don't despair, because there are treatments out there for you! Theriac, also known as treacle, was a standard topical medicine that was used by medieval physicians to cure leprosy, applied to the lesions on the patient's skin. It was an ointment, or compound, made from up to 70 different ingredients – including the flesh of vipers – and it was believed to cure a wide range of ailments, from digestion issues, jaundice and asthma to the plague. Another popular topical treatment for leprosy was mercury, which we now know is a poisonous substance.

SECOND OPINION

If the thought of applying theriac or mercury to your skin doesn't appeal to you, then you can always turn to good old bloodletting. It was commonly believed that leprosy was the result of too much black bile in the body and that the blood needed to be purified in order to restore the balance between the humours. With this in mind, a more extreme treatment was to bathe in the blood of either children or virgins as another way to clean the blood – however, animal blood was often used instead.

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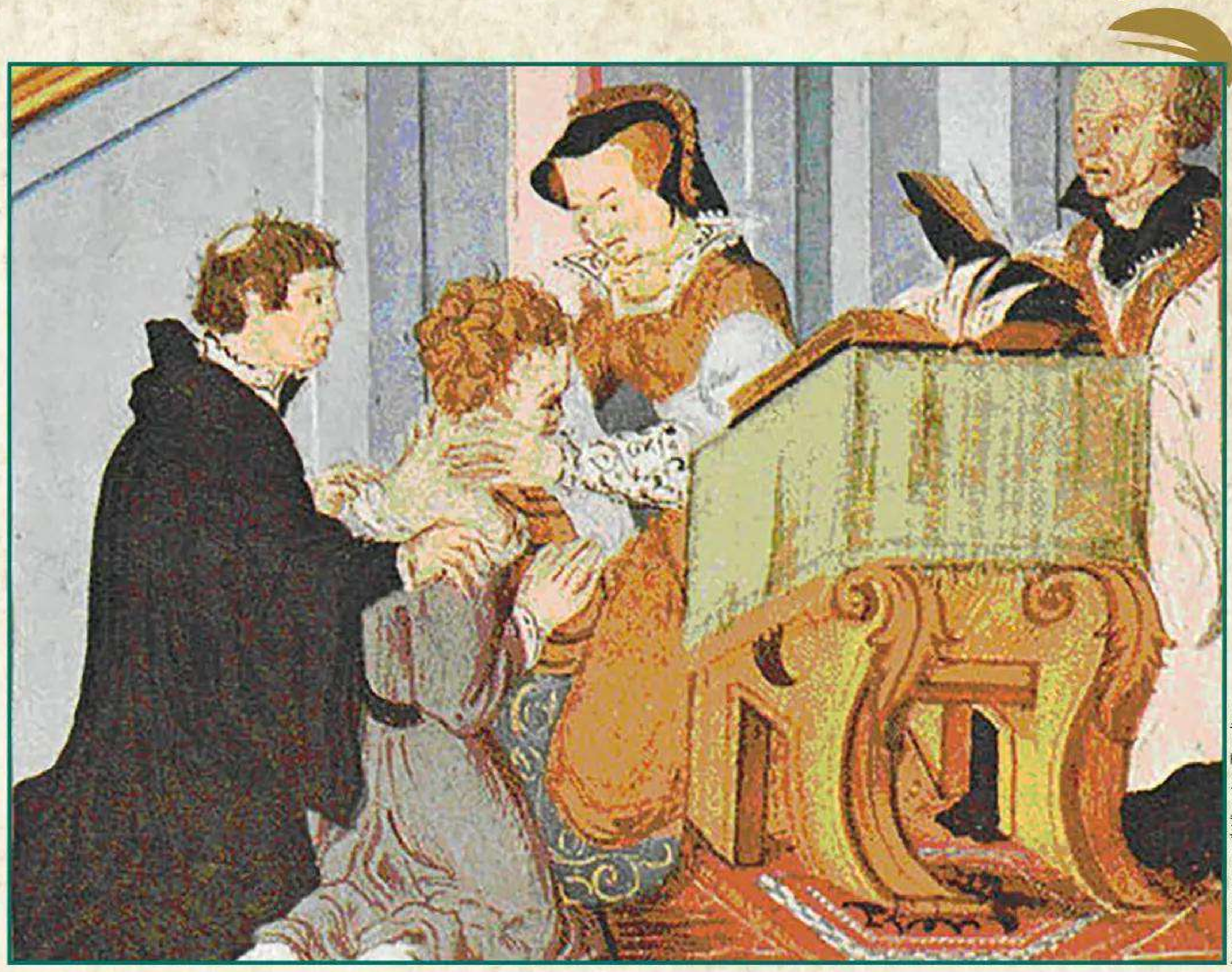


Image source: wiki/Levina Teerlinc

NECK SWELLING

MEDIEVAL DIAGNOSIS: SCROFULA
RECOMMENDED TREATMENT: THE KING'S TOUCH

If the lymph nodes in your neck are swollen and painful, then you may have scrofula – a skin disease caused by tuberculous bacteria that could prove fatal in medieval times. Thankfully there was a cure for scrofula: the 'king's touch'. Also known as the 'royal touch', the monarchs of England and France held ceremonies where they would touch hundreds of people suffering from scrofula and supposedly cure them, which lead to the disease being commonly referred to as the 'king's evil'. Superstition played a huge role in medieval medicine, offering explanations for the unknown, so it's no surprise that the 'king's touch' was so popular. The seeming ability to perform such a miracle also emphasised the belief that the monarchs had been given the divine right to rule by God, reinforcing their position.

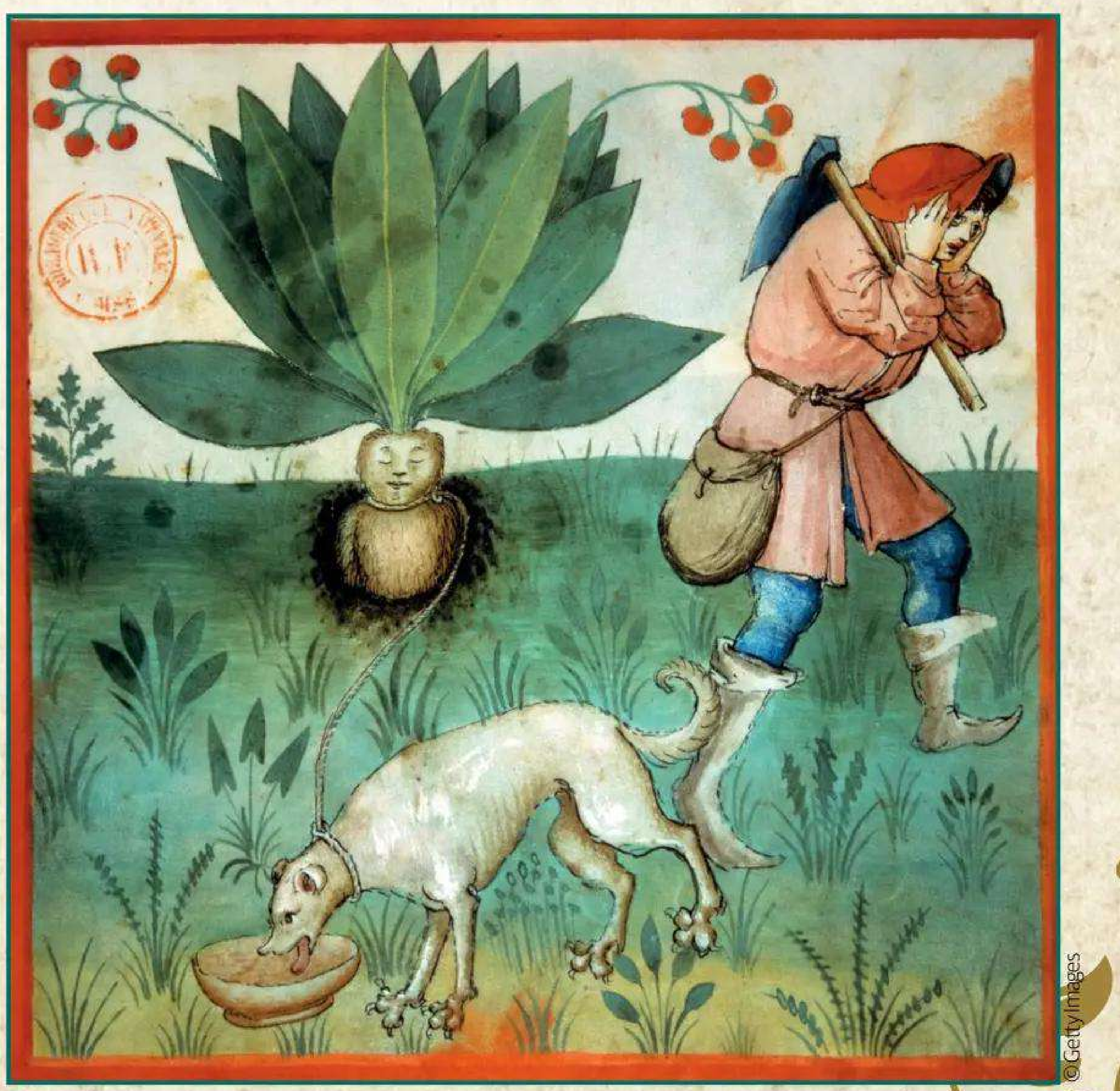
HOT, SWOLLEN JOINTS

MEDIEVAL DIAGNOSIS: GOUT
RECOMMENDED TREATMENT: MANDRAKE

Nobody wants hot, red, swollen joints that are very painful, which is why gout is such a troublesome disease. Luckily, there's a medieval treatment that can cure it once and for all! Mix some powdered mandrake with wine and drink the concoction for seven days to reduce the swelling and relieve the pain for good. Mandrake was a popular ingredient in medieval medicine and it was used to treat various illnesses, but it had to be prepared carefully as it was considered a difficult plant to harvest. This is because the roots resembled a human and it was believed that once it was removed from the earth, the mandrake would release screams that could cause madness. To prevent this, make sure to stuff your ears with mud so that you can't hear them!

SECOND OPINION

If you don't want to risk being driven mad by a mandrake, there's another herbal medicine that's a lot safer to prepare. Mix wine, cumin, leeks and laurel berries together and drink the mixture every day until you're cured. If all else fails, it's worth trying some bloodletting to restore the balance between the humours as it was believed that gout was caused by excess phlegm.



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DEPRESSION

MEDIEVAL DIAGNOSIS: MELANCHOLIA
RECOMMENDED TREATMENT: FLOWER TEA

In the medieval period there were several different ways to treat melancholia, which we would identify as depression today. Peonies were believed to have healing properties and were frequently used for medicinal purposes, which includes helping those dealing with melancholy. A drink would be made from peony roots and given to patients, however it probably wouldn't have helped them at all because we now know that peony roots are actually poisonous! The physician Rhazes was forward-thinking when it came to his understanding of melancholia and mental illness, and he recommended baths for patients as well as an early form of behaviour therapy.

SECOND OPINION

It is important to note that mental health and illness was not understood properly during the medieval period and it was often attributed to evil demons and witches. As a result, patients were also subjected to barbaric treatments such as starvation, drowning and beatings. They were also locked away in asylums for the insane.

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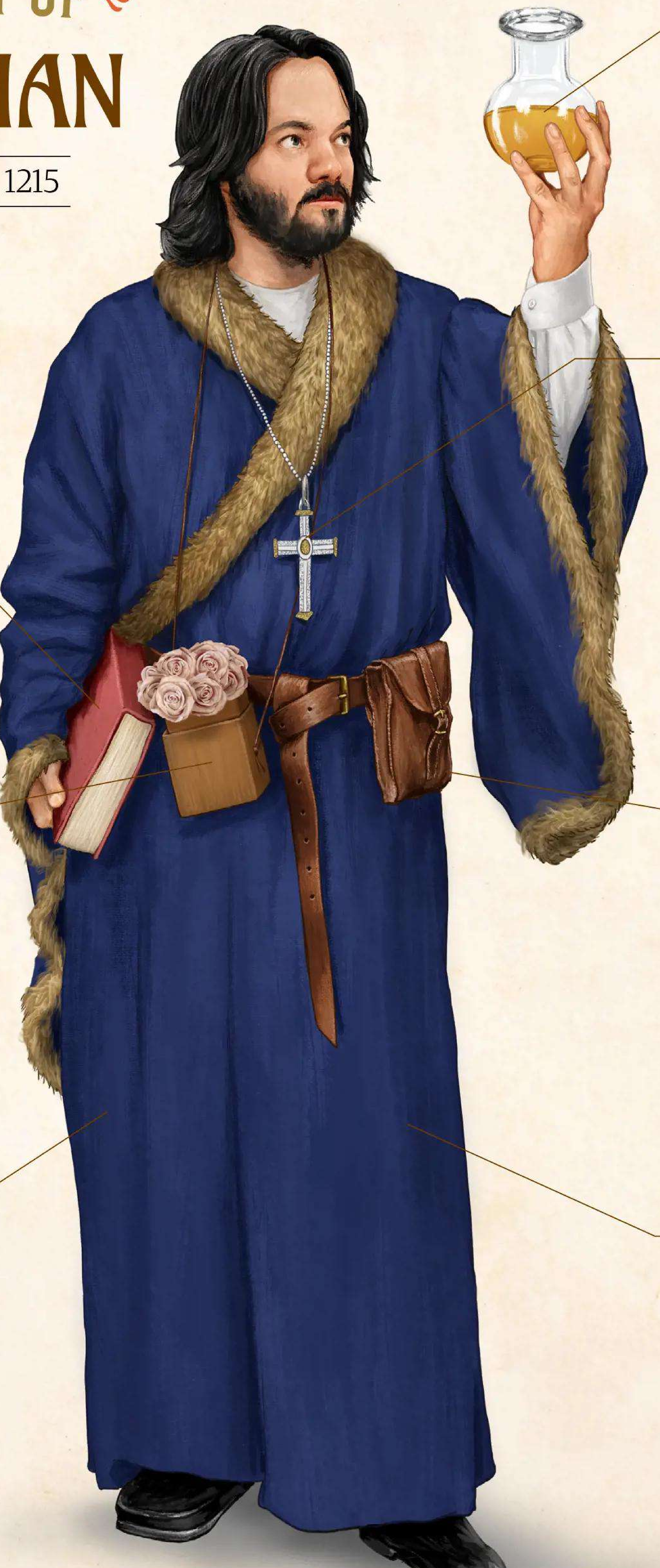
THE ANATOMY OF
A PHYSICIAN

WESTERN EUROPE, 1215



EDUCATED MEN

High-end physicians in the Middle Ages were university educated and their medicine was rooted in the writings of ancient Greeks such as Hippocrates and early medieval Arab physicians. They treated aristocrats and royalty, explaining illness as an imbalance of the four humours (or distinct bodily fluids): black bile, yellow bile, phlegm and blood.

A BUNCH OF POSIES

It was widely thought that diseases were carried by smell so physicians would seek to protect themselves by masking any stench. Posies were a popular choice but oranges were also used. Flowers also came in handy for treating smallpox – as well as giving patients red food and drinks and wrapping them in red cloths, physicians would use roses to treat the disease.

CUTTING TREATMENTS

There were some extreme cures for disease. Inflamed lymph nodes within the armpit or groin areas would be sliced open to allow the pus to drain, while trepanation would see a hole drilled into the patient's skull so that blood build up could be relieved or intracranial diseases cured. Being made to vomit – another way of balancing the body – seemed tame in comparison.

JAR OF URINE

Patients would be asked to provide a urine sample and this formed a fundamental part of a physician's diagnosis (together with an examination of blood and stools). They would compare the colour of the urine with a chart in a medical treatise, holding the flask up to the light for a good look. Diagnoses would be looked up in a *vade mecum* book.

A CRUCIFIX

Physicians saw no distinction between medicine and faith, and disease could also be attributed to everything from demons and sin to the stars and punishment from God. Although they were recognised as a distinct professional class in 1215, their treatments – be they bloodletting or herbal remedies – went hand-in-hand with prayer and relics. To the medieval worldview, all things had a spiritual dimension.

MONEY PURSE

Physicians would always charge high fees for their services, with renowned practitioners in England typically commanding 100 marks for their treatments (a mark being a medieval unit of account worth 160 pence). This would be the equivalent of some £48,000 today, with many physicians put on a retainer fee that attached them to a royal or noble household.

DRAWING OF BLOOD

Working on the basis that fire, water, earth and air controlled the humours, physicians believed the body would be 'balanced' by removing 'bad blood' (they thought blood was static and stagnated in certain parts of the body). Ailments were therefore treated by clamping leeches to the patient's skin (sometimes to the eyes). Over time, physicians themselves were nicknamed leeches.

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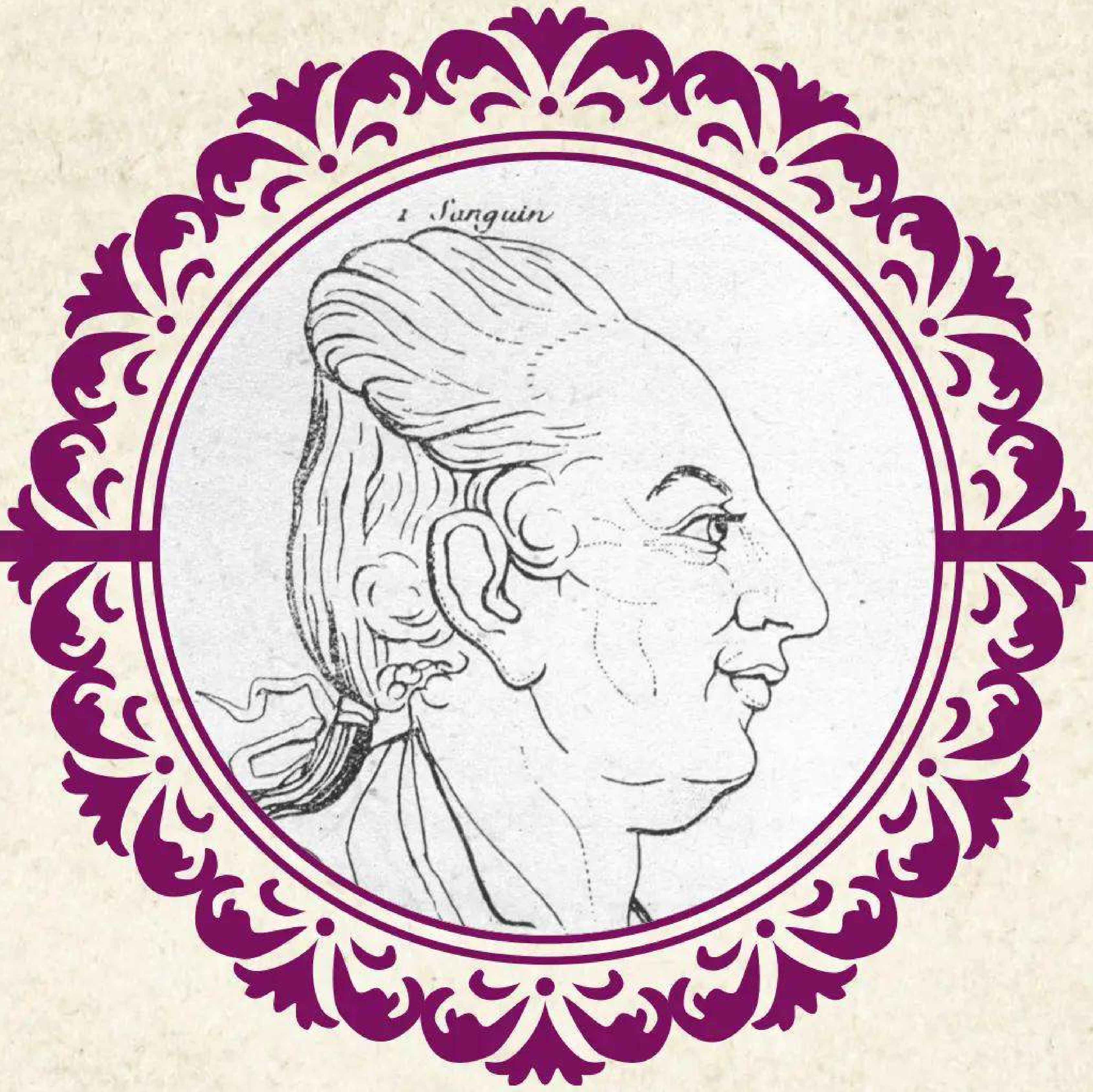


THE FOUR HUMOURS

No, it's not a joke, it's the ancient and medieval version of our present-day range of personality types.

Words Edoardo Albert

Each humour produced its own character, as shown in this drawing of sanguine, phlegmatic, melancholic and choleric individuals

By the high Middle Ages, that is from the 11th century onwards, the disruptions caused by the Muslim attacks on southern Europe and the Viking attacks on northern Europe had eased. The first universities were being established and more and more books from antiquity were being copied. In these new universities, the contents of these old books was being debated and taught by the masters of the arts. Among these rediscovered writers was Claudius Galen (CE 129 – 216). Galen was known as the 'Prince of Physicians' and his writings on how the body worked became the foundation for the medieval understanding of medicine.

Galen had had the opportunity to investigate the human body much more thoroughly than most of his contemporaries because, in his home town of Pergamon (present day Bergama in Turkey), he was doctor to the town's gladiators. Treating their wounds, Galen saw inside the human body in a way that few other doctors of the time could, since the ancient world forbade the dissection of corpses. Galen's reputation grew because he saved the lives of an unusual proportion of the injured gladiators and, when he moved to Rome, he was subsequently appointed physician to the emperor, Marcus Aurelius.

Galen built on the work of predecessors such as Hippocrates and Aristotle. Ancient science believed that everything in the world was made up of different proportions of four fundamental elements: air, earth, water and fire. Within the human body, these elements became the four humours, the constituent elements of the body: blood (air), black bile (earth), phlegm (water) and yellow bile (fire).

A person's temperament revealed which of these humours prevailed in their constitution. People with a preponderance of blood were sanguine. Those who had more phlegm than anything else were phlegmatic. An excess of black bile produced melancholic individuals, while too much yellow bile resulted in a choleric character. The humours affected the personality by producing vapours that, like all gases, rose up, collecting in the head, thereby determining the person's temperament.

According to this theory, people remained in good health so long as their humours remained in relative balance with each other. However, should the humours slip out of balance, then illness was the result. Not having a theory of microbes and disease contagion, which was impossible until the invention of the microscope revealed the microscopic world, doctors believed that the humours were thrown out of true by lifestyle or environmental factors. Among those environmental factors were the seasons, as each humour was associated with a season. Blood, being thought of as hot and wet, was paired with spring. Hot and dry summer had a tendency to produce an excess of yellow bile. Black bile, which was cold and dry, was autumn's humour and cold and wet phlegm was naturally associated with winter.

By the way, they're not called 'humours' because they're funny. The word in fact derives from the Latin 'humorem', which means 'moisture'.

BLOOD

It's not surprising that blood was seen as the key humour: it's the only one whose importance is obvious to anyone, doctor or not

According to Galen, blood was the key humour, the basis of all the others. Blood provided the energy for the body and the soul. An individual in whom this humour predominated was sanguine: happy, generous, enthusiastic and amorous. Not surprisingly, this was regarded as the humour that, in excess, caused the fewest problems although an imbalance could lead to fevers and rashes. A blood sample could also be used to determine the relative balance of the humours because blood, left in a vessel, separates into different layers that appear to show the amounts of the different humours. But unfortunately, because it was the key humour, adjusting the amount of blood in the patient through blood letting became one of the key treatments for disease in the ancient and medieval worlds. Because physicians believed that blood was made in the liver, the prospect of harming a patient through excessive blood letting did not strike them as a risk. Blood was associated with the element air and in terms of the qualities it possessed it was seen as hot and wet. These were seen most often in spring so that was the season associated with this humour. An imbalance of blood would also be treated by prescribing its opposite qualities, such as moving to a cold and dry environment or eating cold and dry food, such as plain bread.

SANGVINEVS
SANGVINEI·FRONTIS·DICVNTVR·IMAGINE·LÆT
VNDE·VOLVNT·HILARES·SÆPE·VIDERE·IOC

Given the choice, the sanguine temperament was the one to be

COLERICVS :2
TRISTES AT COLERA SVNT HI QVI SEMP? ABVNDANT
FORTER EFFECTV QVE MOVET ONME SVO

Choleric people were argumentative and sometimes violent but at least they had energy and drive: they were hot natured people who suffered the diseases of heat

YELLOW BILE

The bilious effects of an excess of yellow bile produced choleric patients and diseases

People with a preponderance of yellow bile in their make up were choleric. By temperament, they were argumentative, short tempered, ambitious, decisive and they could be violent. Yellow bile was produced in the gall bladder and physicians could see it in vomit – think of the yellowish, whitish fluid produced when all the contents of the stomach have been emptied but you are still vomiting. That was thought to be bile. Yellow bile was paired with the element fire and, since its qualities were heat and dryness, its season was summer. An excess of yellow bile produced jaundice, high temperatures and fevers, and stomach disorders. These could be treated environmentally by cold baths, to act against the heat and dryness of yellow bile, or by eating cold and wet foods, such as fish. Because yellow bile was associated with summer, physicians expected hot weather to result in more people suffering from fevers and stomach problems and this would have been true, since malarial mosquitoes were much more common in summer. Similarly, food spoils more quickly in hot weather, producing more cases of stomach upsets. As such, it's not so surprising that physicians of the time believed that experience confirmed their theory. The word 'bilious', which means spiteful and bad-tempered, has its origin in the idea of the four humours.

> "HARMING A PATIENT THROUGH EXCESSIVE BLOOD LETTING DID NOT STRIKE DOCTORS AS A RISK"

BLACK BILE

Black bile doesn't sound very nice and, according to the theory, it wasn't, making people prone to depression and cancer

The other bile, the black kind, was produced in the spleen and an excess of it made people melancholic. In fact, the word 'melancholic' comes from the Greek word for black bile, showing how deeply embedded the idea was linguistically. Melancholic people were prone to depression, as well as being lazy and prone to eating far too much. Black bile was associated with the element earth and it was cold and dry, with autumn its matching season. To cure people suffering from an excess of black bile, physicians prescribed a diet of hot and spicy foods, warm baths and steam treatments. Cancers were believed to be caused by a build up of black bile in a particular area, which produced the tumours characteristic of many types of cancer. Other diseases that were thought to be produced by an excess of black bile included rheumatism and problems with the joints and mobility. Interestingly, heat and warmth do generally provide some relief from the symptoms of rheumatism, so the treatments could often have produced some relief for sufferers.

MELANCOLICVS
4
OMN·MELANCOLICI·STVDIVM·SINE·FINE·PERERRANT
HAC·GENERIS·CELEBRES·PARE·FVERE·VIRI

Depression is not a modern invention. People in the past suffered from it too, and it was no more fun then than it is now

"INFECTIONS OF THE RESPIRATORY SYSTEM WERE SEEN AS BEING CAUSED BY AN EXCESS OF PHLEGM"

Calm and unemotional, phlegmatic individuals took the world in their stride, although they were prone to coughs and colds due to having too much phlegm

PHLEGM

We still use this term to describe excess mucus

Phlegm gives us the word 'phlegmatic'. According to the dictionary definition, a phlegmatic individual is one who is unemotional and calm, which comes directly from the theory of the four humours. However, too much phlegm could lead to a person being cowardly and dull. Phlegm, as defined by the theory, was not confined to the mucus found in the mouth, throat and nose but accounted for all the clear and white liquids in the body, including sweat and semen, as well as mucus and phlegm. Phlegm was paired with the element water and it was seen as cold and wet, making its associated season winter. Colds and other infections of the respiratory system were seen as being caused by an excess of phlegm. Since these diseases always increase in winter time, there appeared to be further support for the theory here. As these diseases were produced by an excess of the cold and wet qualities associated with phlegm, physicians prescribed treatments that were hot and dry: spicy food cooked without a sauce, for instance, or dry heat. Phlegm was believed to be produced by the lungs and also by the brain, probably because the brain appears grey white when the skull is opened.

DIAGNOSIS BY URINE

It may seem strange to our modern eyes, but for medieval physicians, uroscopy was one of the most valuable skills they could possess

Words Catherine Curzon

In the Middle Ages, physicians turned to their patient's chamber pots to make a diagnosis. For medieval doctors, urine could tell them about all aspects of a person's health.

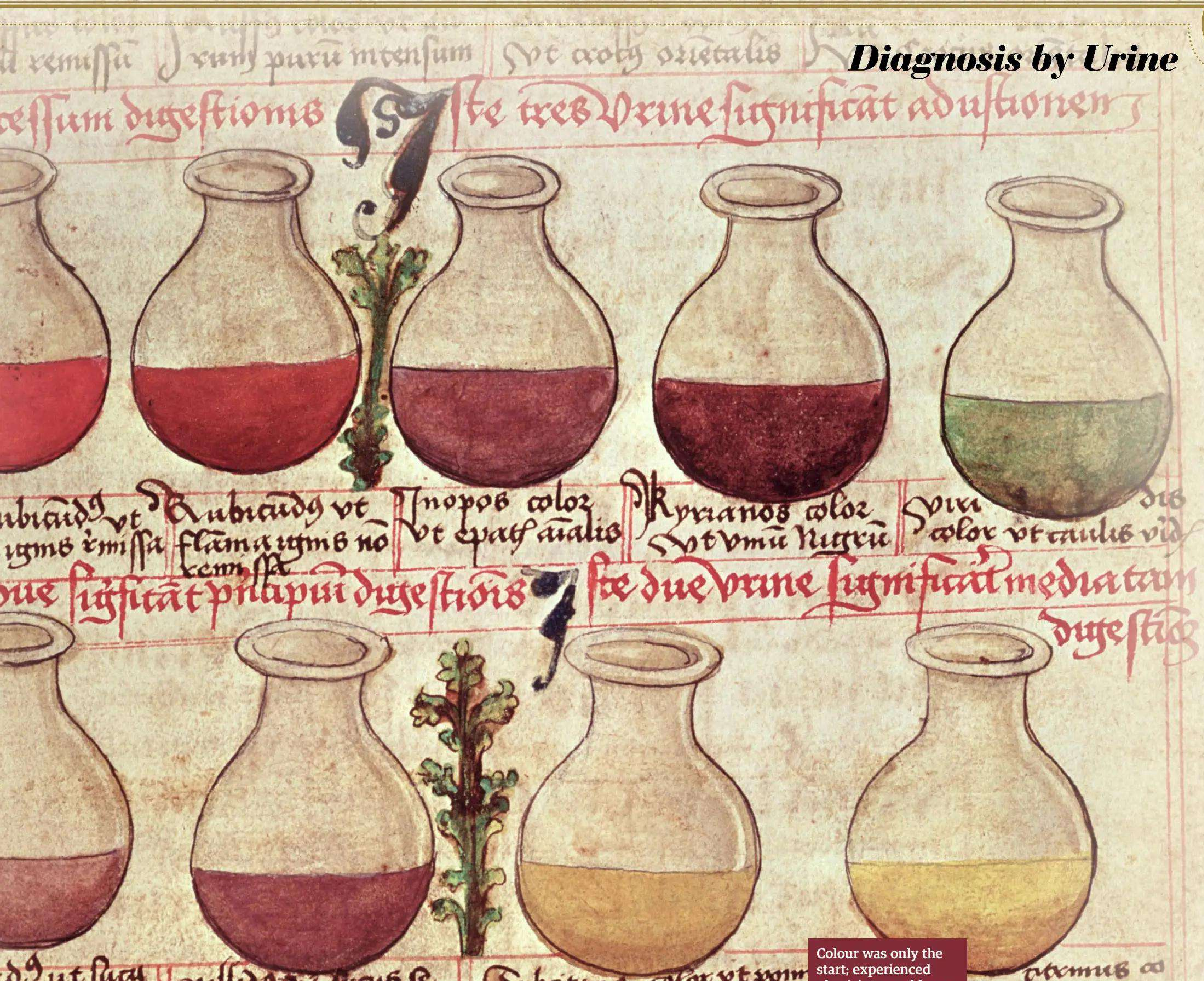
Medieval physicians believed that the urine could provide valuable insight into the balance of the humours, which must be kept in harmony to ensure a patient's health. Should the humours fall out of balance and a person begin showing symptoms of illness, it was believed that the colour of urine would provide immediate insight into exactly what was wrong.

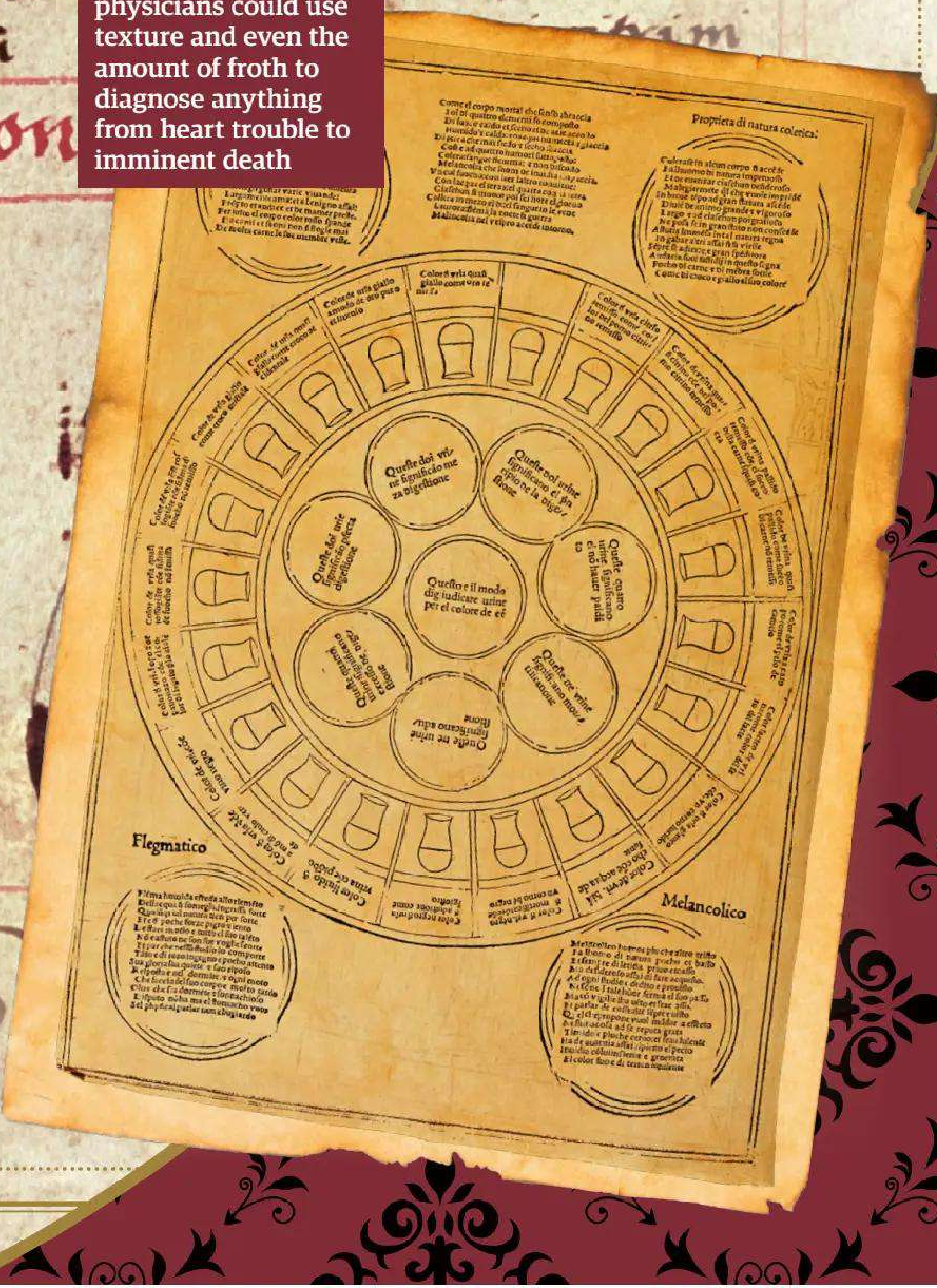
Uroscopy, as the process was known, became its own field and experts – some more genuine than others – produced treatises in which they discussed how to diagnose maladies via a visual inspection of urine. These early medical texts described in sometimes lurid detail the various hues of pee and related them to all sorts of medical conditions. In cases where the difference in colours was barely noticeable, helpful authors added colour wheels and swatches, allowing physicians to match the sample to its exact shade on the chart.

Yet it didn't end with simple colour matches. More advanced practitioners went further and divided a urine sample into three distinct layers which, according to them, could be used to make a more definite and nuanced diagnosis. From colour to bubbliness, froth and thickness, every element played its part. In addition, texts advised physicians to pay attention not only to the liquid itself, but to anything that might be found in it. By looking out for blood or evidence of debris in samples, they were able to diagnose anything from ruptured blood vessels to kidney stones.

Perhaps surprisingly, patients didn't even need to visit their doctor to receive their diagnosis. Instead, they would simply send a sample to the physician and wait to hear what the problem might be. From a headache to imminent death or even when a patient was ovulating, the doctors could tell a lot from a sample, sometimes without even setting eyes on their client in person.

Of course, not everyone was convinced by the practice and urology was often the target of criticism and satire, as more and more untrained practitioners taught themselves the skill. Though the process increasingly became associated with quacks, it remained a popular and affordable option for people seeking a diagnosis. Today, urine may not be used to diagnose everything under the sun, but it remains a key part of a medic's testing regimen, even without the colour swatches.





Colour was only the start; experienced physicians could use texture and even the amount of froth to diagnose anything from heart trouble to imminent death

Medieval physicians turned to charts of colour swatches when it came to matching an example of their patient's urine for diagnosis

HEALING WITH THE POWER OF THE STARS

In the Middle Ages, your date and time of birth was key information for doctors – it was believed to be essential for healing your illnesses effectively

Words April Madden

In the Middle Ages, what we would today call superstition and magical thinking was a vital part of understanding how the world was believed to work. Horoscopes in particular were essential for doctors to understand a patient's maladies and treat them effectively.

Your date and time of birth told a physician what your star sign was, and also what sign of the zodiac the moon and other stars and planets were in. This was believed to govern the kind of person you were, what disorders you were susceptible to, and what treatments you would best respond to. According to the doctrine of the four humours, somebody born under the earth sign of Taurus would be likely to be melancholy, suffering from an excess of black bile, which would manifest as depression and joint pain. The cure was thought to be hot baths and spicy foods, particularly ginger, to rebalance their earthy humour, which interestingly are some complementary remedies for these disorders that are still advised today alongside modern medicine.

But the planets, and the signs of the zodiac, were also thought to have a wider remit, and to rule over particular areas of the body themselves. The sun ruled over the heart, while Mercury ruled the brain. Jupiter ruled the liver, and Saturn the skin. To treat disorders of these areas, it was considered beneficial to gather the herbs used in medicines when the associated planets were visible in the night sky.

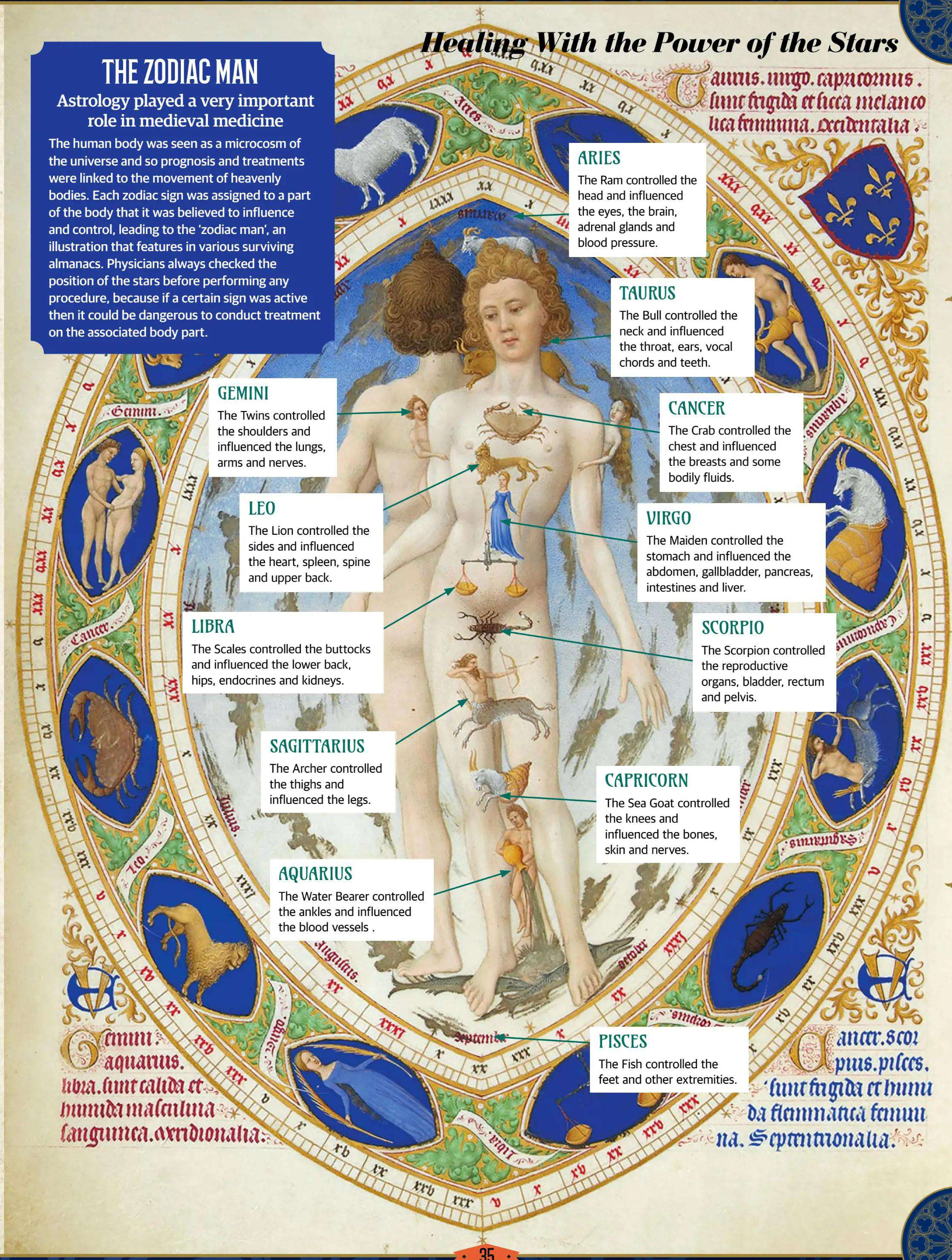
Physicians in the Middle Ages regularly advised blood-letting as a cure-all for most ills, but this wasn't as simple as popping to the barber-surgeon and opening a vein. The surgeon had to work out the best day and even time to bleed a patient, based on their age and the phase of the moon, and whether it was in a zodiac sign that corresponded to the area of the body that was affected by the ailment. The moon moves through the zodiac much faster than the sun does, and changes sign every couple of days, meaning patients typically had to wait a maximum of a fortnight for properly timed treatment.

To help physicians with their complex astronomical calculations, they carried portable charts which were folded up and hung from their belts for easy reference, today nicknamed 'bat books'.

THE ZODIAC MAN

Astrology played a very important role in medieval medicine

The human body was seen as a microcosm of the universe and so prognosis and treatments were linked to the movement of heavenly bodies. Each zodiac sign was assigned to a part of the body that it was believed to influence and control, leading to the 'zodiac man', an illustration that features in various surviving almanacs. Physicians always checked the position of the stars before performing any procedure, because if a certain sign was active then it could be dangerous to conduct treatment on the associated body part.



ARIES
The Ram controlled the head and influenced the eyes, the brain, adrenal glands and blood pressure.

TAURUS
The Bull controlled the neck and influenced the throat, ears, vocal chords and teeth.

GEMINI
The Twins controlled the shoulders and influenced the lungs, arms and nerves.

CANCER
The Crab controlled the chest and influenced the breasts and some bodily fluids.

LEO
The Lion controlled the sides and influenced the heart, spleen, spine and upper back.

VIRGO
The Maiden controlled the stomach and influenced the abdomen, gallbladder, pancreas, intestines and liver.

LIBRA
The Scales controlled the buttocks and influenced the lower back, hips, endocrines and kidneys.

SCORPIO
The Scorpion controlled the reproductive organs, bladder, rectum and pelvis.

SAGITTARIUS
The Archer controlled the thighs and influenced the legs.

CAPRICORN
The Sea Goat controlled the knees and influenced the bones, skin and nerves.

AQUARIUS
The Water Bearer controlled the ankles and influenced the blood vessels .

PISCES
The Fish controlled the feet and other extremities.

DEADLY DISEASES

Infectious illnesses were the leading cause of death in the medieval world and even those who survived could be marked for life

Words Ben Gazur

Medieval people were a lot more familiar with death than we are today. Most people died in their own homes whether from an accident or illness. The coroners' rolls which survive list causes of death as diverse as babies eaten by pigs, falling out of a window while relieving oneself, and drowning in a well. These accidents could be understood to some extent but the major factor in most people's deaths was disease.

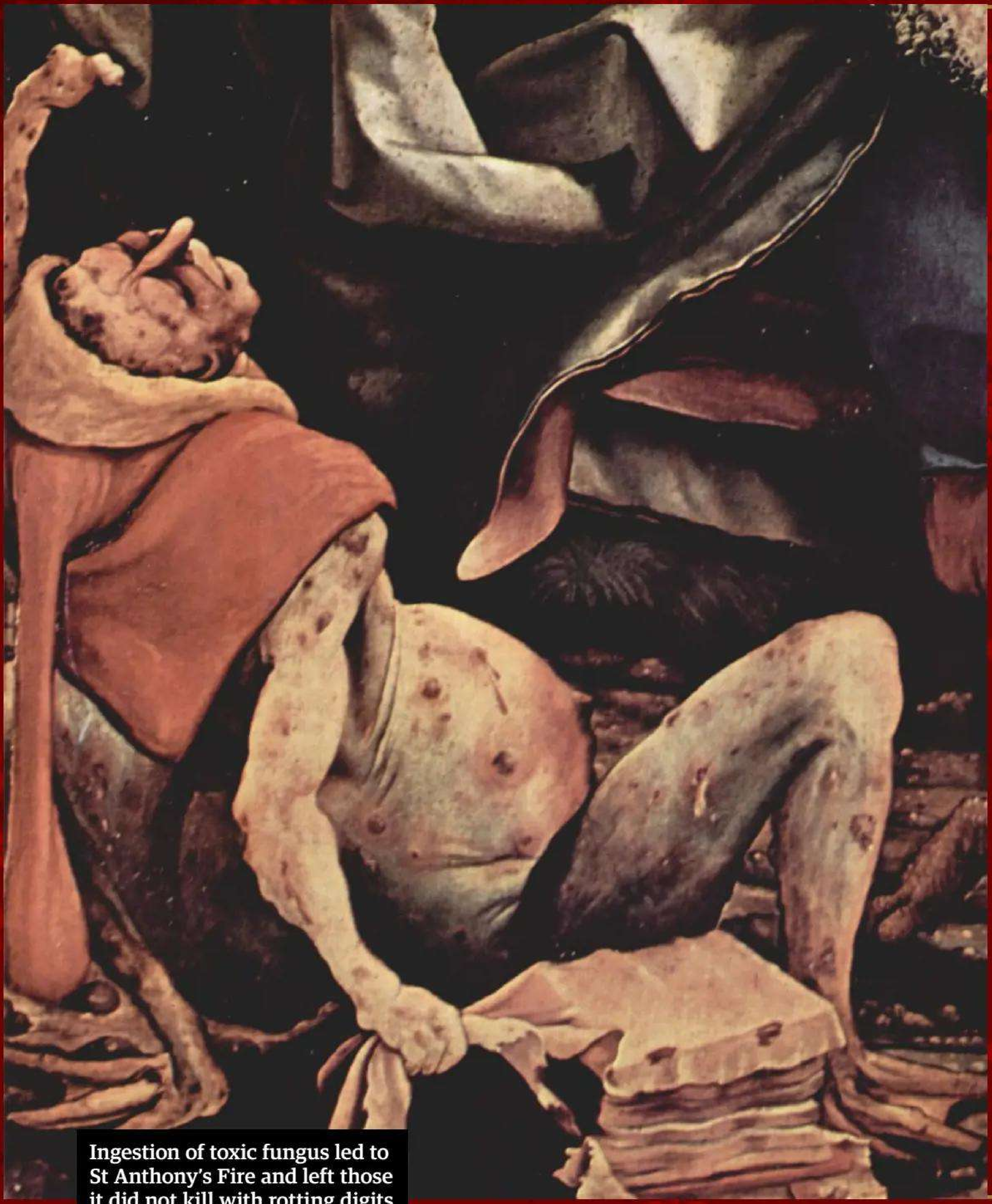
To the medieval mind diseases were almost inexplicable as they had no knowledge of bacteria or viruses. They seemed to strike almost at random and without reason. A person could be healthy one day and dying of a horrifying ailment the next, and there was little anyone could do to help them beside prayer. There was nothing you could effectively do to protect yourself from infectious ailments.

Diseases were blamed on everything from the wrath of God, to bad smells, to the influence of the heavens, to witchcraft. Treatments relating to each of these possible causes was tried at one time or another but few offered any certainty of survival. The range of infections did not help. Something which seemed to work for dysentery would not cure scabies. Infections which have all but disappeared from the modern world, like leprosy or anthrax, were very real dangers to our ancestors.

The level of filth, as we would consider it, that most people lived in was the perfect breeding ground for epidemics to form and spread. Medieval people existed in a world without effective sewage systems; animals roamed freely, and lice and fleas carried infections from person to person. While the medieval period was not the stinking morass of Hollywood imagination it definitely gave more scope for contagions to proliferate.

Today, thanks to antibiotics, vaccines, and improvements in public health, most people in Europe will not die from an infectious disease, but this is a relatively new state of affairs. Only in the 20th century did non-communicable causes of death like cancer and heart disease become the major killers. We are at risk of forgetting the terrors that even simple infections could inflict on victims in the medieval era. There was no certainty that a scratch would not turn into a fatal sepsis.

As well as the daily dangers of lesser illnesses, though they could prove life threatening, medieval people had to contend with waves of more potent infections that swept through the population. Here are seven diseases that struck fear into Europe in the Middle Ages.


Ingestion of toxic fungus led to St Anthony's Fire and left those it did not kill with rotting digits and limbs

ST ANTHONY'S FIRE

Before the introduction of modern soaps, skin diseases were common ailments. Because prayers to St Anthony were thought to be efficacious in curing them, several diseases came to bear his name though each had a different cause.

The most common disease called St Anthony's Fire is known today as erysipelas. Here bacteria cause large, swollen, and red patches of skin, often on the face. This is accompanied by pain, fever, and vomiting. Death can follow, but even those who recover often develop the disease again, which can lead to permanent disfigurement.

A second form of St Anthony's Fire was probably caused by eating rye grain infected with ergot fungus. This fungus produces a toxin that causes psychosis, spasms, vomiting, and gangrene in the extremities. Monks of the Order of St Anthony were considered experts in the treatment of this disease as they used potions to increase blood flow to the limbs, and fed patients meals free from ergot.

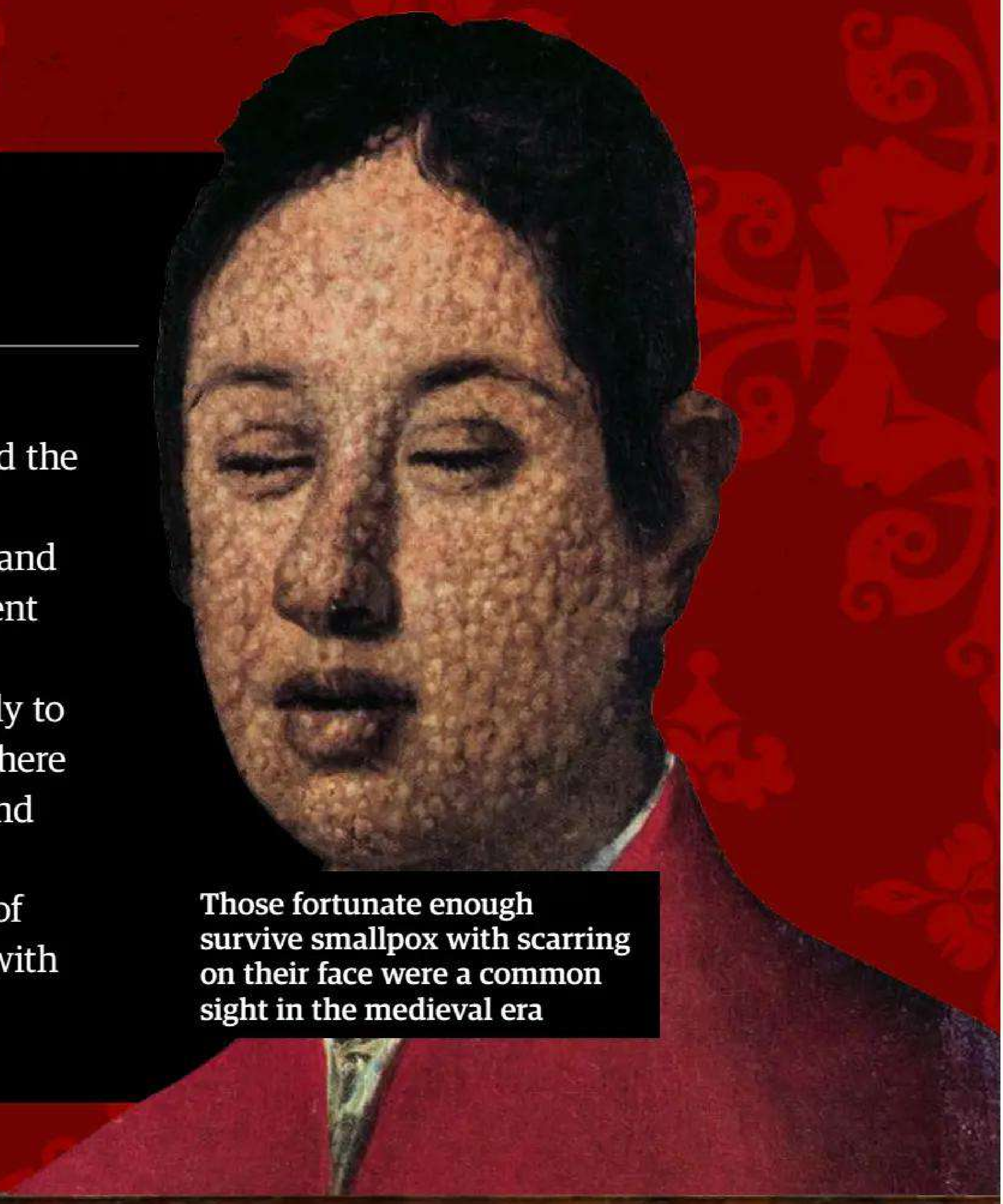
"PRAYERS TO ST ANTHONY WERE THOUGHT TO BE EFFICACIOUS IN CURING THESE DISEASES"

SMALLPOX

Smallpox, caused by the variola virus, was a major killer in medieval Europe. It is thought that the widespread travel associated with pilgrimages and crusades spread the disease across the continent.

Those who got infected would develop a high fever and lesions all over the skin and internal mucous membranes. The large rash marks filled with fluid and, if the patient was lucky, began to scab over. If the lesions remained close to the skin it generally meant the sufferer was destined to die. Once scabs had formed the victim was likely to survive – but often terribly scarred and perhaps blinded by the infection. Because there are several forms of smallpox it is hard to say what the mortality rate was but around 20 to 40 per cent of those infected died.

Treatments varied from herbal mixtures to cold cloths. When a son of Edward I of England caught smallpox his doctor John of Gaddesden prescribed wrapping him with scarlet cloth and filling his bedroom with red objects.


Those fortunate enough survive smallpox with scarring on their face were a common sight in the medieval era

DYSENTERY

Dysentery, known as the bloody flux, was a scourge of medieval Europe and waves of infection could devastate whole communities. Whether caused by bacteria or amoeba, those infected with dysentery suffered from abdominal pains and extreme diarrhoea that was often accompanied with passing large volumes of liquid, blood, and mucus. Fluids are lost as fast as they are consumed and many patients died of dehydration. The young and old were particularly susceptible but even those in the prime of life died of dysentery.

Armies on the march often suffered more deaths from dysentery than combat. Dysentery is spread via faecal contamination and military camps provided few ways to keep clean or dispose of human waste. Even those with access to the greatest wealth could not avoid dysentery. King Louis VIII of France died of dysentery after serving with his army. Cities and their polluted water sources also allowed rapid spread of infection.

Chroniclers spoke of bad food as the cause of dysentery which, along with contaminated water, is one of the routes of infection. Suggested cures varied. The flesh of a hare was thought to help. Recitations of Psalm 56 and the Lord's Prayer were sometimes prescribed alongside bed rest and fasting.

v comencent la vie p les

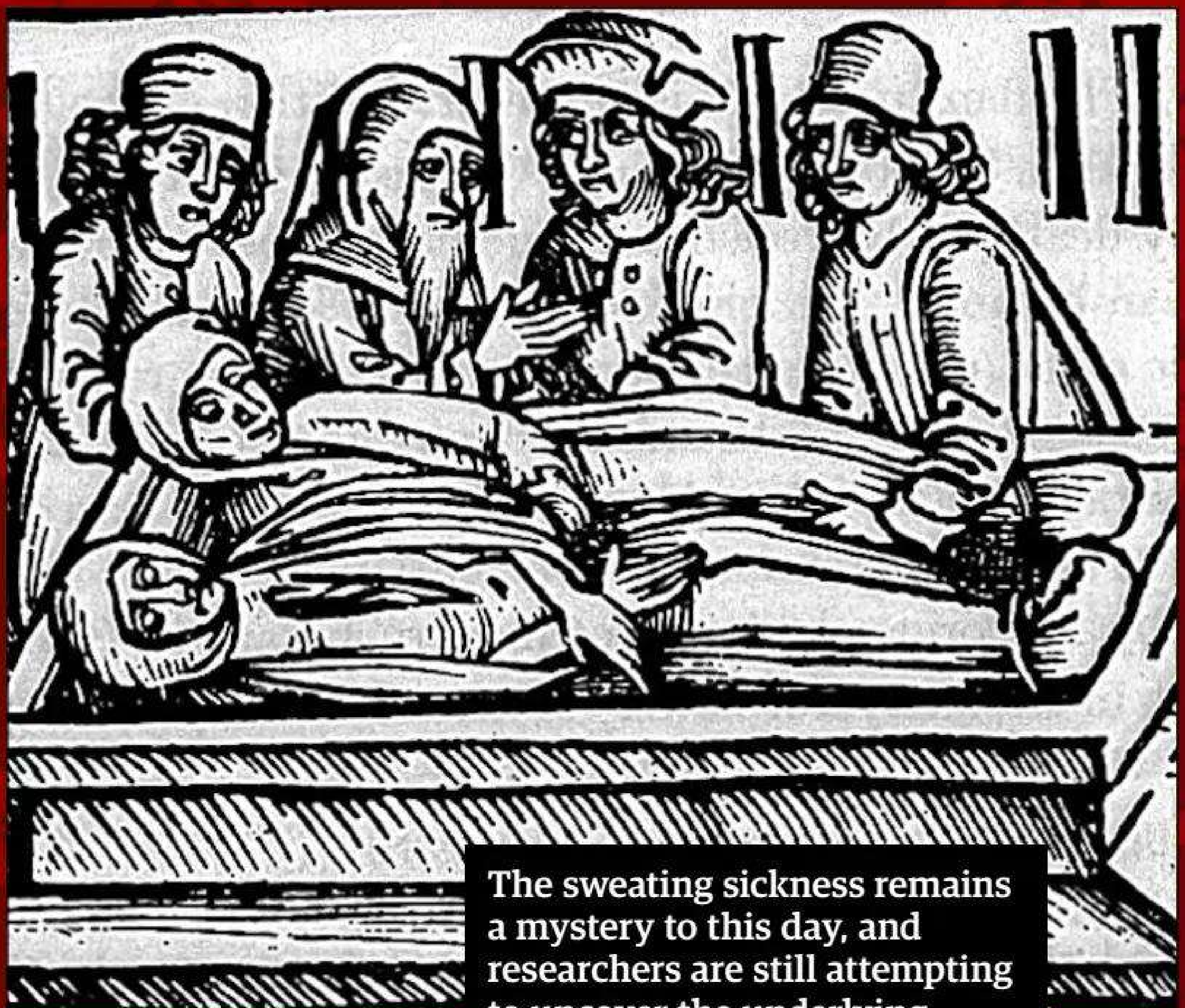
King Louis VIII of France died of dysentery in November 1226 while returning from a campaign in southern France

Plague led to mass burials in cities as people sought desperately to fight the deadly infection, usually with little or no success

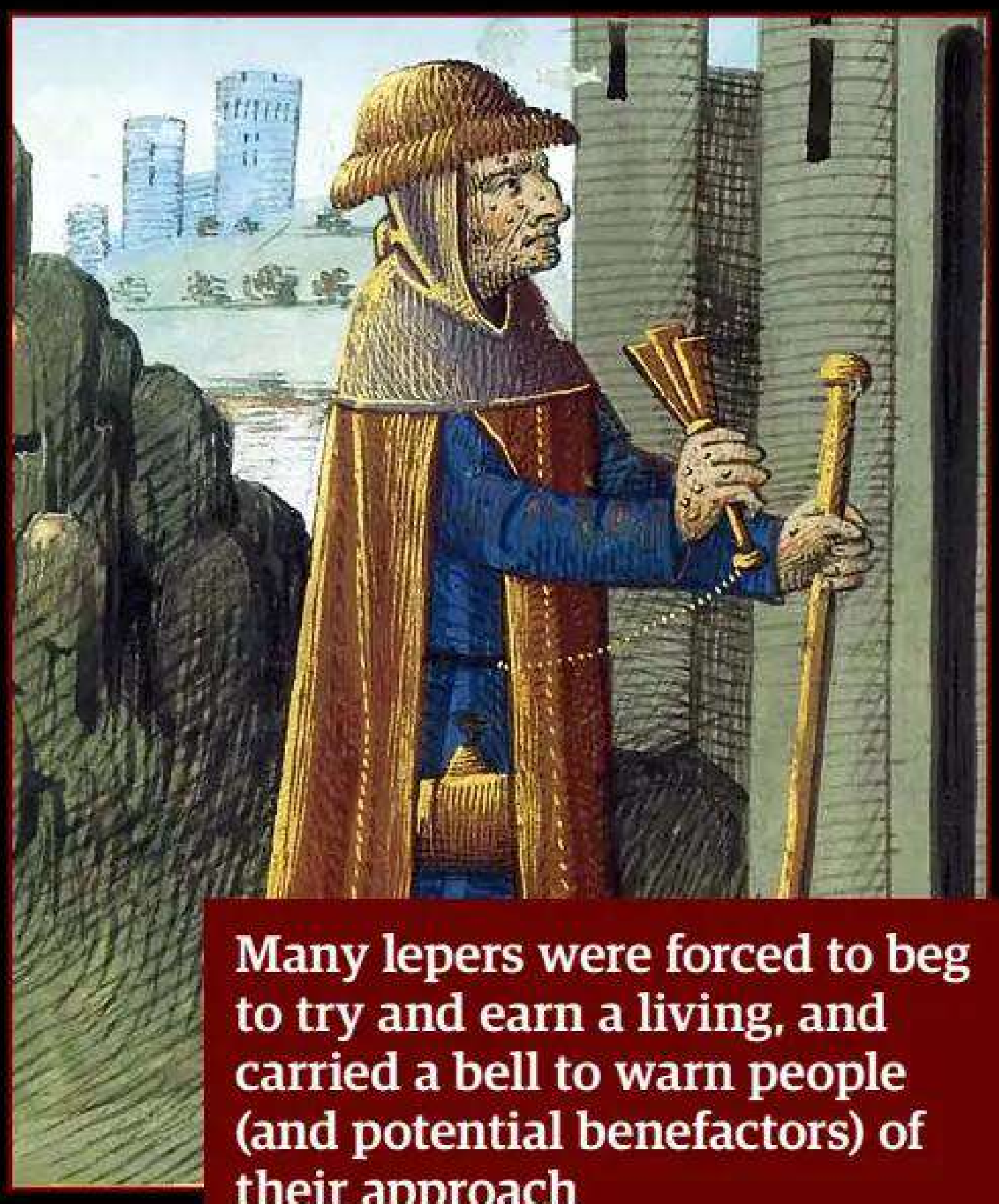
PLAGUE

The arrival of the Black Death in Europe in 1346 was a cataclysm. Several chroniclers reported that it seemed like the end of the world. As the plague spread it killed perhaps half of the population of Europe in less than a decade. Caused by a bacterium that was spread by fleas the Black Death caused fever, pain, and swollen lymph nodes which turned black, called buboes. Cures offered included rubbing snake meat on the buboes, ground emeralds, and fumigation but none stopped the plague returning periodically for centuries afterwards. The effects of so many deaths changed the face of European society.

> "AS THE PLAGUE SPREAD FROM COUNTRY TO COUNTRY IT KILLED PERHAPS HALF OF THE POPULATION OF EUROPE IN LESS THAN A DECADE"



The sweating sickness remains a mystery to this day, and researchers are still attempting to uncover the underlying cause of the disease



Many lepers were forced to beg to try and earn a living, and carried a bell to warn people (and potential benefactors) of their approach

LEPROSY

Leprosy was a disease well known in the ancient world and continued to trouble medieval Europe. Those afflicted with the disease took years to develop symptoms such as patches of insensitive skin and nerve damage. Over time fingers and toes, as well as the nose, could fall off. Lepers were driven from society to halt the spread of the illness and official records exist showing authorities rebuking those who continued to appear in public. Yet people with leprosy had to trade or beg to earn a living. Leper houses were built to segregate and care for victims of leprosy as medicine seemed complete ineffective.

STDS

Armies at war tend to contain many men seeking sexual relief. It was not uncommon for commanders to lament that their soldiers were brought down by "the burning", which was caught from sex. This was probably gonorrhoea. Edward IV of England claimed he lost many men whose "penises rotted away, fell off, and they died." Lead solutions injected into the urethra were thought to help.

Syphilis first emerged in Europe in 1495 and spread across the continent alongside marching armies of mercenaries. The disease begins with a small lesion at the site of infection but spreads. Over years it can lead to rotting of facial features, madness, and death.

Sexually transmitted diseases often plagued soldiers, and could do as much if not more damage to an army than the enemy it was fighting

THE SWEATING SICKNESS

Few historical epidemics are more mysterious than the sweating sickness which stuck England in the 15th and 16th century. A person could be well in the morning and dead by the evening after contracting "the sweats". The disease began first with a sense of fear, then shivering, headaches, and dizziness before intense sweating broke out. Doctors at the time were experienced with the usual forms of plague, infection, and influenza and none could agree on what sort of illness this was.

The sweating sickness had several unusual features. When it occurred it was often found mainly in one location and did not spread across the country. Unlike many diseases this was one which tended to occur in high summer and those who died were more likely to be young and healthy adults. It was known as Stoop Gallant as it brought down many proud and dashing aristocrats.

During the outbreak of sweating sickness in 1528 the court of Henry VIII was severely struck. Both Anne Boleyn and Cardinal Wolsey caught the disease, though they recovered, and Thomas Cromwell lost his wife and two daughters. Treatment involved confining the patient to bed. After an outbreak in 1551 the sweating sickness disappeared forever and there is still no agreement on what it was.

LIVING WITH LEPROSY

Leprosy was a fact of medieval life. Yet the popular image of the shunned leper ringing a mournful bell was far from accurate

Words Catherine Curzon

By the Middle Ages, leprosy was firmly embedded on British shores. Known today as Hansen's Disease, leprosy is an infectious disease that causes devastating physical symptoms and whilst today it can be successfully treated, in the medieval world that wasn't the case. Anecdote suggests that those living with leprosy in the Middle Ages were shunned and isolated, condemned to a living death, reduced to scratching a living by begging or relying on charity. In fact, whilst opportunities were severely restricted, the popular image of the isolated, feared leper owes more to Victorian stories than reality .

Today, we know that medieval physicians may have struggled to tell leprosy apart from other conditions that presented with similar signs, yet for those self-same physicians, it seemed like an easy diagnosis. They looked for physical symptoms such as misshapen limbs and facial features, or tell-tale sores all over the body. The treatment were ineffective, ranging from consumption of ginger to fanciful potions containing gold for the wealthy. Of course, bleeding was attempted as was coating the skin with all manner of potions and ointments. Some of these contained mercury, some holy water and even, in some cases, fresh blood. By doing this, patients hoped that they might somehow drive the disease out.

Medieval physicians also overestimated how contagious leprosy was and eventually leprosaria, or leper houses, began to open across the country. Often supported by charitable and religious groups, these establishments were placed on the extreme outskirts of a town or city or even at its gates, still part of the community, but separated from it all the same. Many wealthy people became patrons of these leprosaria, hoping their generosity might secure them entry to heaven; indeed, in many cases these bequests were accompanied by requests that the lepers who benefitted would pray for their benefactor's soul.

For residents of many leprosaria, life was similar to that in a religious order. Men and women were often separated and where they were not, celibacy was a required condition of residence. Life was intended to be contemplative and devoted to religious faith and observance. Inhabitants were regarded as having ritually removed themselves from society, a sacrifice they were making in order to atone for the sins of all mankind. In return for their suffering on Earth, they were guaranteed entry to heaven, with no stop in purgatory before the pearly gates.

In the Middle Ages, leprosy was rife in England; it was an issue that society had to confront head on

Whilst life was simple for the residents, it was not as bleak you might imagine. People living in leprosaria were not isolated from family and friends, but were allowed to receive guests and make home visits too. Perhaps unsurprisingly given the apparent peace and tranquillity of their living arrangements in a world that could be difficult, the leper houses became attractive propositions to the able-bodied too. Records exist that show some lepers became dissatisfied when perfectly healthy people attempted to take up residence, attracted by the lifestyle on offer and not at all fearful of contracting the disease.

It was the Black Death that changed everything. Following the plague epidemic, fear of disease was suddenly magnified and suddenly the lepers who had previously lived alongside their fellows increasingly became figures of fear. Once regarded as pious unfortunates, some were now vilified as carriers of disease. The plague had left a lingering shadow and where once there was charity and tolerance, now lepers carried the unmistakeable threat of death.

The devastation caused by the Black Death forced the closure of many leprosaria and by the 14th century, there were far fewer than there had been just a few decades before. Although they were often very small organisations and records were rarely kept, it is believed that at least 320 such houses existed into the 14th century, with the first being established in 1030 CE. Whilst it isn't possible to accurately say how many people chose to confine themselves, it would certainly have been an attractive option for those who otherwise faced uncertain and perhaps extremely challenging futures.

> “LEPER HOUSES BECAME ATTRACTIVE PROPOSITIONS TO THE ABLE-BODIED TOO”

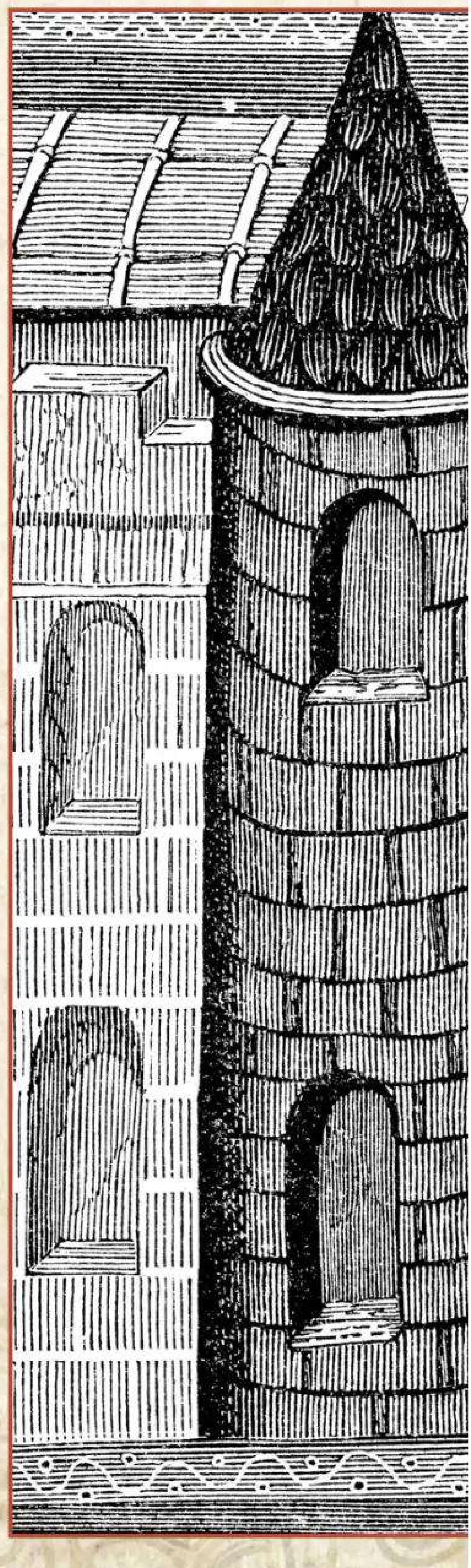
However, life in the leprosaria wasn't always contemplative and spent in prayer. At a 12th century leper house in London, eight healthy clerics cared for 16 unmarried female patients, all of whom had made the required vows of poverty, chastity and obedience. However, whilst poverty was certainly unavoidable given the often perilous finances of charity establishments, chastity and obedience were less easy to enforce. During inspections, officials were shocked to record that not only had sexual intercourse certainly taken place between the clerics and the women, but that the ladies were anything but meek and obedient too.

For lepers who begged on the streets, a bell warned people of their presence whilst also attracting those who wanted to give charity

However, not all leper houses required religious vows. Some were established by towns themselves or by private individuals, and whilst the price of admission to many leprosaria were those vows of poverty, obedience and chastity, others took a more pragmatic view. In some cases, privately owned leper houses charged an admission fee, a practice that some authorities attempted to stamp out by opening charitable houses funded by the parish or town. But money could help in all sorts of ways and a wealthy benefactor was worth his weight in gold. One leprosaria was established in London specifically to house a yeoman of Edward IV who had contracted the disease. The king himself gifted his faithful retainer the land on which to build a leprosaria for his personal use.

Yet whilst some went willingly into leprosaria, others did not. In the wake of the Black Death, anyone suspected of the disease was subject to laws that required them to be assessed by officials and, should they be found to be infected, to voluntarily isolate themselves. For those who refused, the writ de leproso amovendo could be executed,

Those living with leprosy were assured that their suffering on eErth would fast-track them into heaven when the time came



which allowed officials to forcibly remove a leper from society. Whilst these laws were rarely used, the threat of them was often enough to cause people to flee if they showed signs of the disease. There was the question too of how such assessments could reliably be carried out; after all, many skin diseases shared symptoms with leprosy and when it came to establishing who was and who wasn't infected, mistakes must surely have been made.

Unsurprisingly give the role of faith in the Middle Ages, many people living with leprosy made pilgrimages to shrines to pray for healing. In fact, so entwined was leprosy with the concept of faith and religious sacrifice that in Jerusalem, the Order of Saint Lazarus was formed by Crusaders who were housed in a leper house. The Order was dedicated to providing care for fellow sufferers as well as sending knights with leprosy on the Crusades to become an order formed by leper knights. It was little comfort given the symptoms of the disease, but some textbooks advised that when physicians gave a diagnosis of leprosy, they must remember to tell their no doubt petrified patients that, if nothing else, at least they would certainly go to heaven.

But not all lepers were ready to go to heaven, nor did they necessarily wish to be separated from society. Life in the leprosaria was not for everyone and soon the figure of the leper as a street beggar entered popular consciousness. Surviving on the charity of strangers and with their sores wrapped in bandages, the leper would ring a bell as they walked, both to warn people that someone living with leprosy was nearby, but also to attract the attention of those who might make a charitable donation. Of course, for those inhabitants of urban centres who feared infection, this bell was a chilling sound; they would much prefer that all lepers agree to confine themselves to the leper houses.

The idea of a medieval world that shunned lepers outright is a misnomer. The response to leprosy in the Middle Ages was complex and far from consistent nationwide, but it was not without some measure of understanding and respect. Those Victorian-told tales of lepers being shunned, declared dead and locked away or even condemned to a miserable life on the streets owe more to scaremongering than reality. Whilst informed by the faith and beliefs of the time, there were efforts not only to afford medieval lepers humane treatment and care, but to provide them with places to live and worship. Of course, to take advantage of these offers might require sacrifices and the decision to enter a leprosaria could not have been taken lightly. Yet despite fear of infection, for many living with leprosy in the medieval world there was the opportunity to do so in relative safety and, most crucially of all in a time when no cure was possible, with a certain degree of dignity.

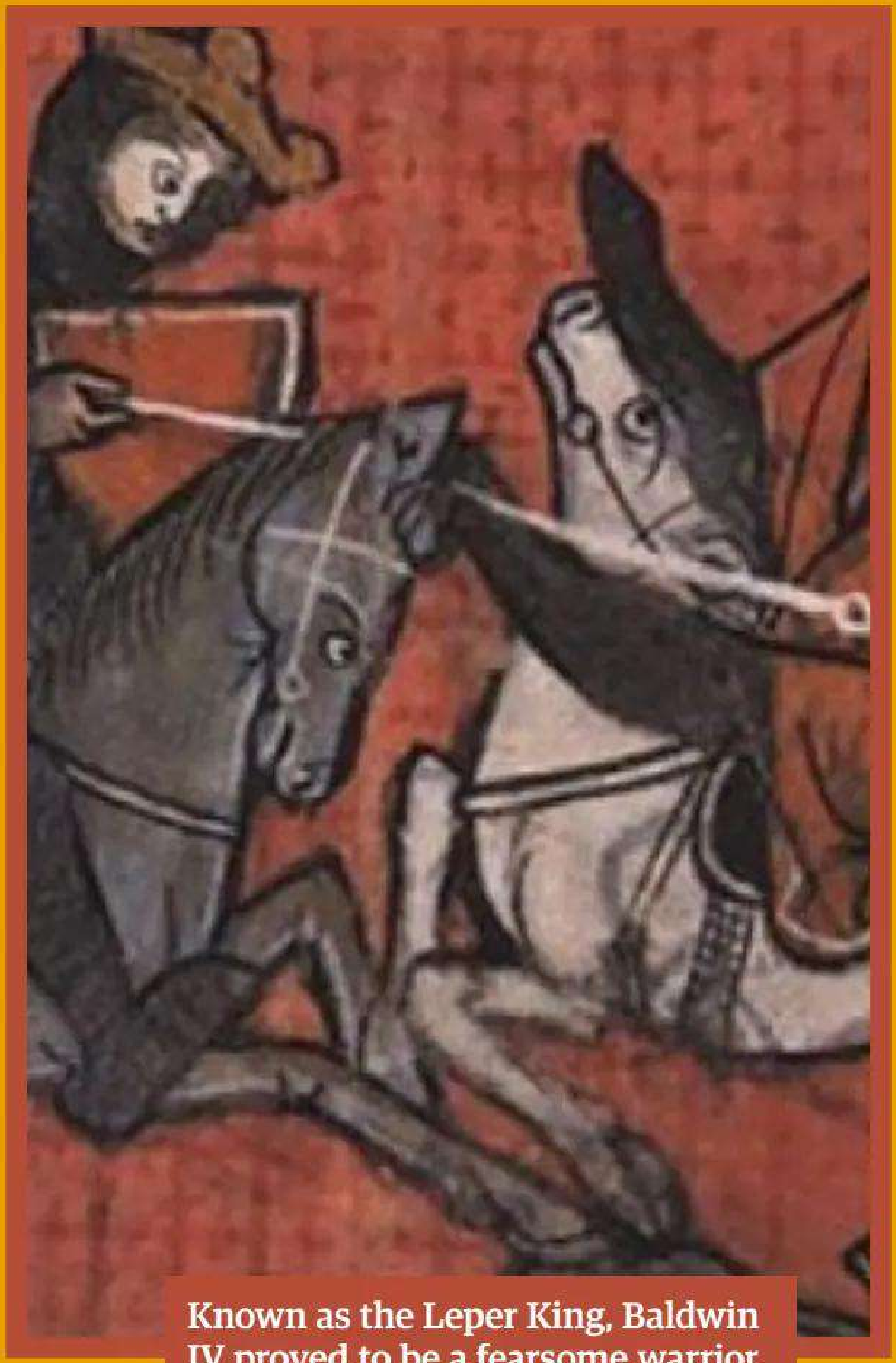
Leprosaria offered those living with leprosy a safe place to live; in fact, some perfectly healthy people attempted to gain admission too

THE LEPER KING

Despite his disease, Baldwin IV was an active monarch

Known as the Leper King, Baldwin IV was king of Jerusalem from 1174 until his death in 1185, at the age of 25. Having first exhibited symptoms of leprosy in childhood, Baldwin's illness progressed throughout his life to a devastating degree, eventually robbing him of his sight, much of his mobility and even the use of his hands by the time of his death. Despite his condition, armies under Baldwin IV's command defeated Saladin's efforts to seize his lands and the Leper King retained control of his Crusader state.

Precluded from marriage and fatherhood by the disease, Baldwin brokered a marriage between his sister, Sibylla, and the ambitious Guy of Lusignan. It was a match he came to regret, as a battle for power broke out that almost resulted in civil war. Though King Baldwin named his young nephew as his heir prior to his death in 1185, his victory over Guy was short lived. His successor, Baldwin IV died the following year and Sibylla proclaimed her husband, Guy, king. It was to prove a disastrous appointment. Saladin defeated Guy in 1887, destroying Baldwin IV's former realms forever.

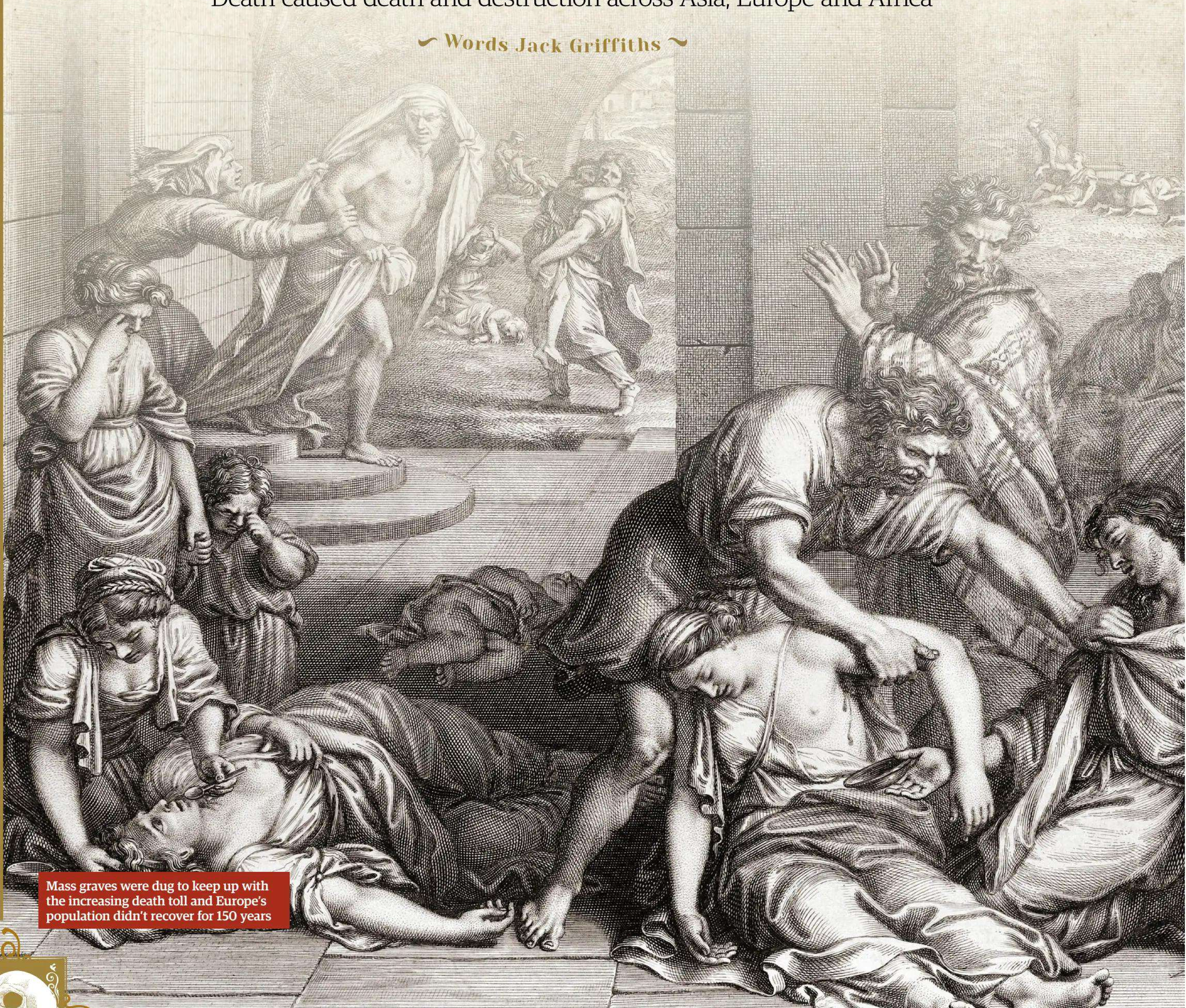


Known as the Leper King, Baldwin IV proved to be a fearsome warrior and shrewd politician despite battling the debilitating disease

THE BLACK DEATH

One of the deadliest epidemics in history, the seemingly uncurable Black Death caused death and destruction across Asia, Europe and Africa

Words Jack Griffiths



Mass graves were dug to keep up with the increasing death toll and Europe's population didn't recover for 150 years

The Black Death was a form of plague that ravaged Asia, Europe and parts of Africa in a mass epidemic in the mid 1400s. This deadly outbreak originated in China as early as 1334 and reports of mass death and a halt in trade and warfare in Asia arrived in Europe in 1347. Shortly after, came the disease itself. It was transmitted by fleas, just 1-3 millimetres in size, who hitched a ride on black rats that had stowed aboard trade ships destined for Mediterranean ports. Critically, black rats were resistant to the disease and would survive long enough as the fleas' host to effectively transmit the disease. Within a couple of years, it had spread to the farthest reaches of the British Isles, Scandinavia and the Baltic states.

The most famous form of the plague was bubonic, which was easily recognisable by the painful black buboes that grew on the neck, under the armpits and in the groins of the infected. Even more deadly was the pneumonic plague, which affected the lungs, and the septicaemic plague that poisoned the blood. It was spread by flea and rat bites but also through the air. Recent research has downplayed the role of rats in spreading the disease and suggested that body lice and human fleas were also culprits as was transmission through breathing and contaminated material.

Whichever the variant, at least two of every three infected would die within days. People were buried in mass graves with all methods of medicine failing and the faith in religion shaken. Medicine in the medieval era was not developed enough to understand or treat the disease and many believed it was a punishment from God. In some areas, Jewish people were burned at the stake, accused of poisoning wells to cause disease.

The epidemic placed an increased importance on peasants. With huge numbers of the population perishing, there were fewer people to work the land so the survivors could demand more for the labour they did, increasing pay and boosting rights. By the time the Black Death finally subsided in the early 1350s, a third of England's population had succumbed and more than 25 million people had died in Europe, more than half of the continent's total population. A broken society was left to begin anew. Plagues reoccurred periodically in the centuries to follow but never again on the scale of the Black Death.

Today, the plague is treatable with antibiotics but 14th century medicine had no answer to the devastating epidemic as it spread quickly and uncontrollably

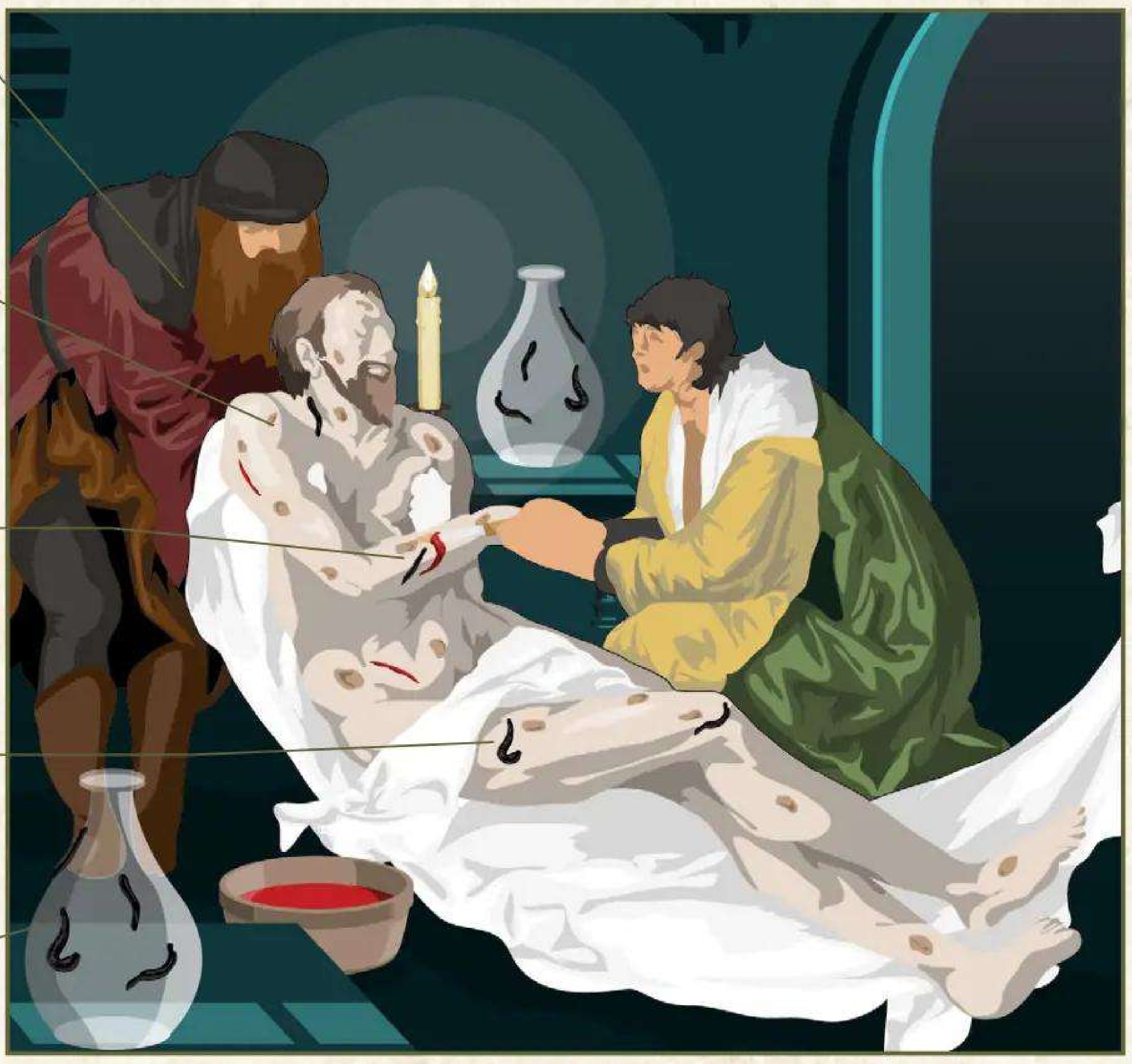
> "WITHIN A COUPLE OF YEARS, IT HAD SPREAD TO THE FARTHEST REACHES"

HOW TO TREAT THE BLACK DEATH

Fight the great pestilence just as medieval physicians did England, 1300s

When the Black Death came to England in 1348, it left a trail of devastation in its wake. More than 1 million people fell victim to the disease that had already swept through Europe, wiping out millions as it continued its merciless progress through the land.

The cause of the Great Pestilence was a mystery and, as doctors struggled to find a cure, some outlandish methods of healing the infection emerged. In this simple guide, you'll learn how to treat a case of the Black Death just as doctors in the Middle Ages did. Whether you'll live to tell the tale is another story.



THE DOCTOR IS IN

Plague doctors might look fearsome but they were actually helpless against the scourge of the Great Pestilence.

MEET THE PATIENT

Stricken with pain, the patient suffering from the Black Death faces a bleak, uncertain, and probably very short, future.

CUT THEM OPEN

Using a sharp blade, open the vein of the inner elbow on the side where the patient is experiencing the most pain.

APPLY THE LEECHES

Apply leeches to the wound. If the infection is already severe, open more veins and apply more leeches.

REMOVE THE LEECHES

Once the leeches have grown fat and fallen off, return them to their jar and dress the wound.

WHAT YOU'LL NEED…

A SHARP KNIFE

FIRE

CANOPY BED

LEECHES

HERBS

01 TIME TO BLEED

As soon as the patient shows even the slightest symptoms of the plague, there's no time to lose. Ask him which side of his body is the most painful and have the surgeon open a vein in the arm on that side or, even better, apply leeches liberally to the painful areas. Bleed him until his soreness dissipates.

02 TAKE YOUR MEDICINE

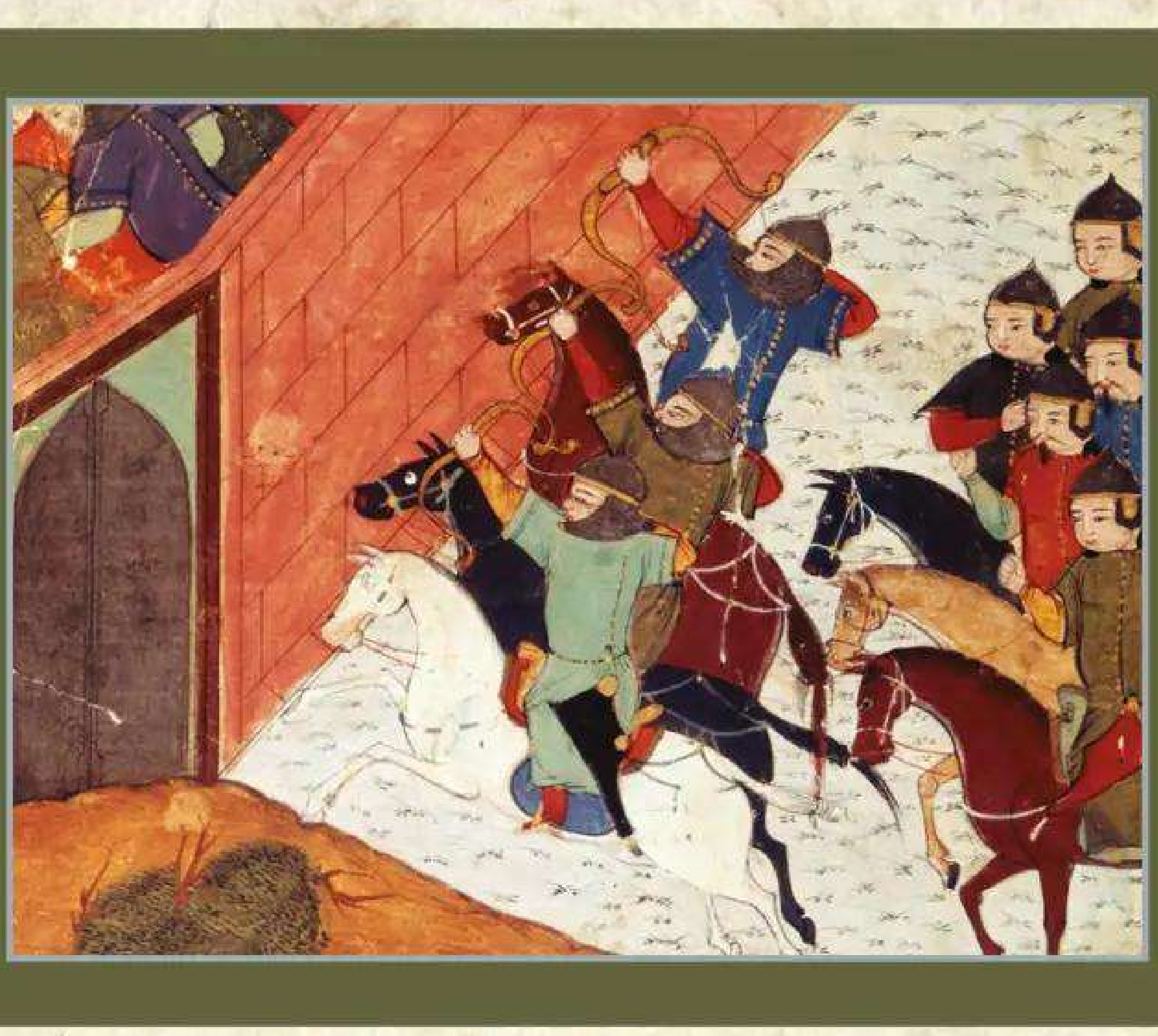
There are all sorts of natural remedies, known as plague waters, available for the Black Death, and your local doctor will know which one is right for your patient. To make your own, mix angelica, juniper, figs, saffron and vinegar. Add a little nutmeg to taste and serve hot – this will encourage the patient to sweat out the pestilence.

HOW NOT TO... DISPOSE OF A BODY

As the Black Death ravaged the lands of Europe, plague pits became a familiar sight, along with vast bonfires on which the bodies of the dead were burned. In the Crimean city of Kaffa in 1347, however, the Mongolian Tatars decided on a very novel way of disposing of their plague dead.

Tatar warriors had besieged the Italian inhabitants of Kaffa without success for months, hoping to drive from the city. Now, with their ranks depleted by plague, the dispirited Tatars began catapulting plague-ridden corpses over the city walls. The Italian populace took fright and many fled Kaffa for their homeland, bringing the Black Death with them to mainland Europe.

This incident is one of the earliest known examples of biological warfare. Though the impact on the mainland was devastating, the Tatars did not conquer Tatar and the city remained under Italian control.

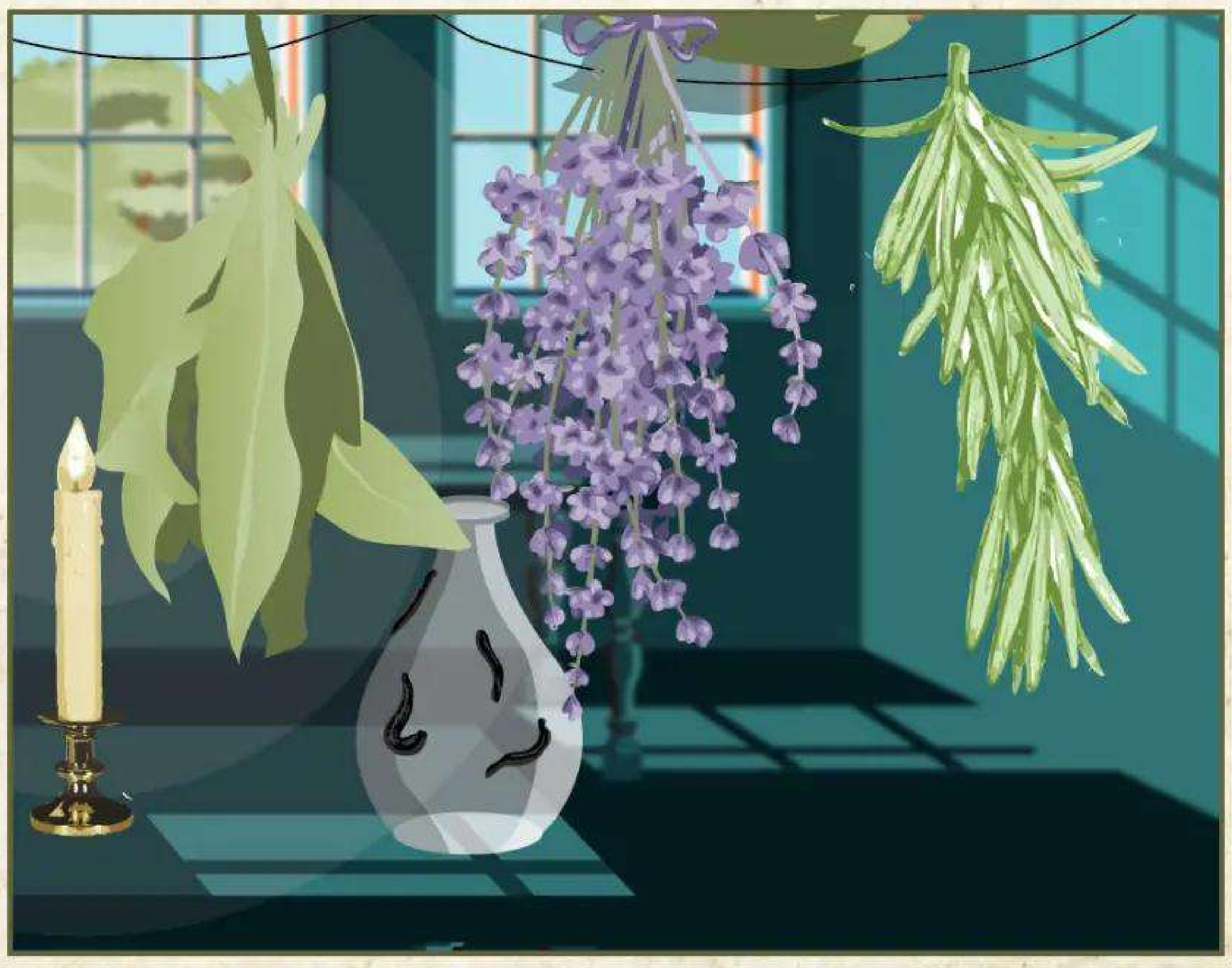


03 BURST BUBOES

As the plague progresses, the telltale buboes will start to appear, most commonly in the groin and armpit. These must be purged without delay as they contain the disease. Apply a hot poultice of lily root, ale grounds and mallow to bring out the boil then pierce the bottom of the buboes to drain out the poison.

04 SWEAT IT OUT

If your patient is mobile, encourage him to sit between two fires; if he is in bed, surround him with bottles filled with hot water. The patient should sweat for a minimum of three hours, preferably even more, as this will encourage the infection out of the body. Dry him off, dress him warmly and put him back to bed.



05 FUMIGATE THE 'BAD AIR'

While the patient rests, it's time to fumigate the miasma. Cleansing the air will help ward off the plague and treat those already suffering. Hang posies of rosemary, sage and lavender in the house, particularly in the sickroom. You can increase the efficacy by keeping a heated bowl of vinegar near the patient and allowing the steam to disinfect the air.

06 REPEAT AD NAUSEAM

Repeat the treatments, occasionally feeding the patient small amounts of simple food such as chicken or veal washed down with mild ales. The patient will soon be on the road to recovery or, sadly, taking a turn for the worst. If your efforts aren't successful, don't feel too disappointed – millions have already fallen victim to the Black Death.

IF THAT DOESN'T WORK, TRY THESE CURES...

FLAGELLATE

Join a flagellation procession and whip yourself for your sins, thus earning God's forgiveness and ridding yourself of plague.

CHICKENS

Pluck a live chicken and hold it against your buboes. This will draw the poison out of you and into the unsuspecting bird.

PIGEONS

If chickens don't work, slice up a dead pigeon and rub its entrails all over your body.

FAECES

Open the buboes and smear them with a paste made from human faeces, tree resin and plant roots. Be sure to bind the wounds up tight!

EMERALDS

Richer patients can crush emeralds into powder, mix them with broth and down them in one gulp.

© Ed Crooks, Getty Images

DARK ARTS OF THE

PLAGUE DOCTORS

Uncovering the professionals and scholars trained in identifying the environmental and bodily signs of the Black Death that existed three centuries before the infamous ‘plague doctor’ costume

Words Winston Black

You’ve seen him before: a mysterious figure, clad from head to toe in oiled Moroccan leather, wearing goggles and a beaked mask. He looks like a cross between a steampunk crow and the Grim Reaper. He’s usually called a ‘plague doctor’ and a quick search online will turn up thousands of examples. Some of these images and costumes claim to represent genuine historical artefacts, while many others are new creations for Halloween and roleplaying. Thanks to the popularity of this costume, it has come to represent for modern audiences both the terrors of the Black Death and the foreignness of medieval medicine.

But this sort of plague doctor did not appear until well after the Middle Ages, some three centuries after the Black Death first struck in the 1340s. There may have been a few doctors in the 17th and 18th centuries who wore this outfit, but most medieval and Early Modern physicians who studied and treated the plague did not. Nor was there a single class of physician in the later medieval and Early Modern periods, who could be represented by a single outfit. Plague prevention and care came from university-trained physicians, surgeons, barbers, apothecaries, midwives, herbalists, priests, miracle-workers and a range of charlatans.

Instead of relying on a single, special outfit, plague doctors instead employed a variety of therapeutic methods and environmental theories to protect themselves and their patients from the contagion of plague. Ideas about the cause and spread of the plague changed over the period of several centuries, as did the clothing worn by plague doctors and the methods they used to treat the disease. Even though these plague doctors, working long before the advent of germ theory and antibiotics, were unable to cure the plague, they deserve more credit than they usually receive for intelligently observing the spread and symptoms of plague and for giving people some degree of hope in an age of constant medical crisis.

The Black Death and the Second Plague Pandemic

The Black Death of the 14th century is well known. When historians discuss ‘the plague’ they are usually referring to

this epidemic of bubonic plague caused by the bacillus Yersinia pestis. The Black Death swept through the Middle East and Europe in the years 1346-1353 but it may have begun several decades earlier in the Qinghai Plateau of central Asia. Plague scholars estimate that 50-60% of the population of Europe died during the Black Death, an even higher proportion than the often-cited 'one-third' of Europeans lost to the disease. Less well known is that the plague continued to strike Europe, the Middle East and beyond for the next four centuries, returning every ten to 20 years. This period of recurring plague epidemics between the 14th and 18th centuries is known as the Second Plague Pandemic. The so-called First Pandemic occurred in the sixth through eighth centuries CE and the Third Pandemic lasted roughly 1860-1960. Few of the later outbreaks in the Second Plague Pandemic were as devastating as the Black Death, but they nonetheless continued to kill 10-20% of the population with each recurrence.

As shocking as it may seem to modern audiences, medieval and Early Modern people grew accustomed to the plague and took this periodic loss of population in their stride.

There are three primary forms of plague. Bubonic from flea bites, pneumonic in the lungs and septicemic in the blood

Doctors and scientists worked to understand and treat plague better, especially in terms of preventing its arrival and spread in their communities. Many important developments in the history of medicine and health occurred against this backdrop of plague: the rebirth of dissection, the discovery of the circulation of blood, and the development of public health measures. It is unclear why the Second Pandemic ended in Western Europe, while it continued to strike in Russia and the Ottoman Empire well into the 19th century.

The Great Plague of London in 1665 was the last major outbreak in England and plague likewise seems to have disappeared from Spanish and Germanic lands after the 17th century. The plague of Marseilles, France, in 1720-1721 is considered to be the last major plague outbreak in Western Europe. Some historians argue that public health had improved to such an extent as to halt the spread of plague, especially through the systematic and effective use of sanitary legislation. Others point to evolutionary changes in human populations, rodent populations, or in the bacteria itself, but none of these claims seem to be holding up to recent discoveries in plague genetics. What is clear is that in the four centuries between the Black Death and the disappearance of plague from Europe, doctors around the continent worked tirelessly to explain, contain and treat this terrifying disease.

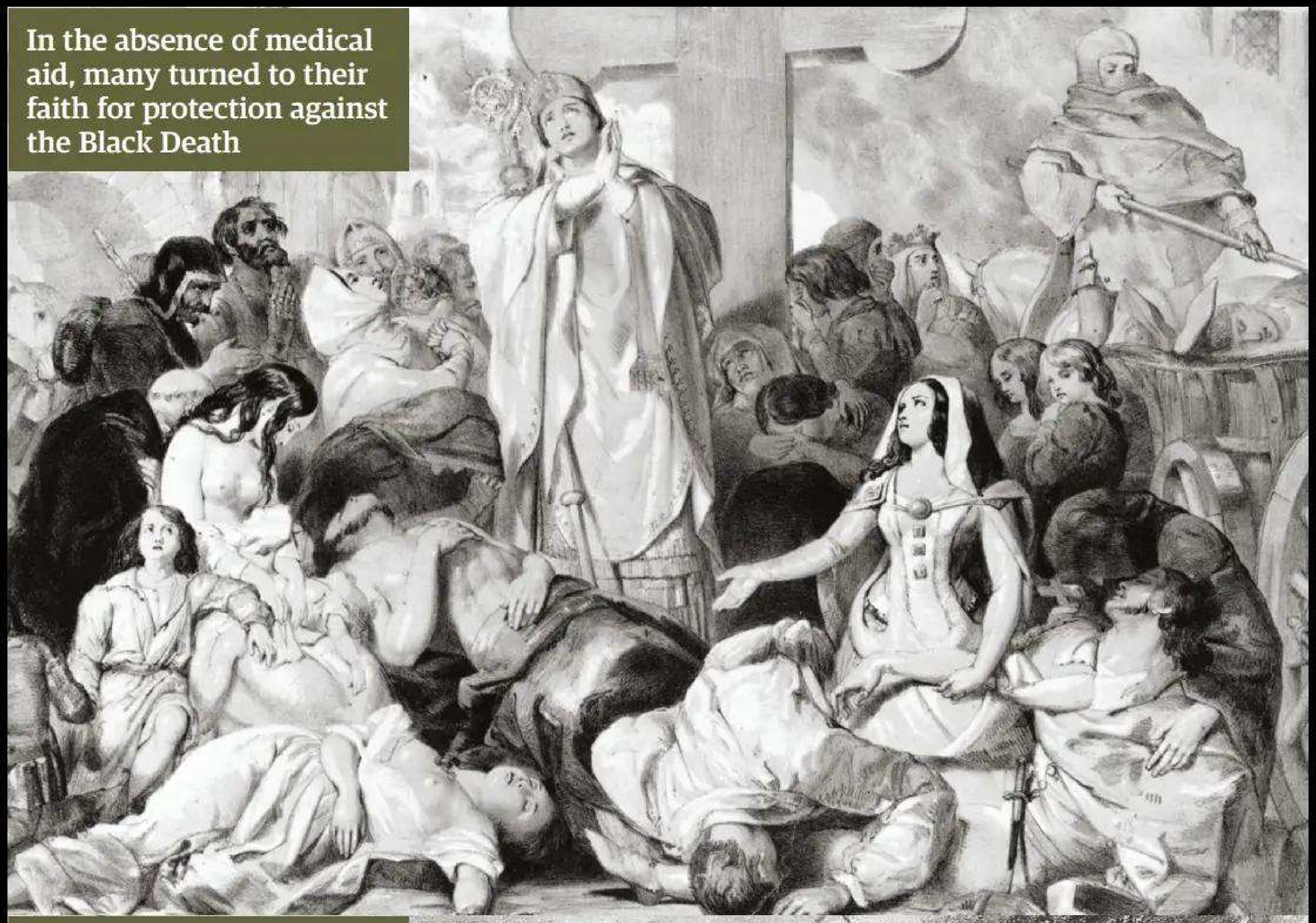
Treating the Plague: Blood and Air

It's easy to imagine that medieval society completely collapsed in the face of a disease that quickly killed off over half the population. This is the picture left by Giovanni Boccaccio, in the often-reproduced preface to his collection of stories known as the *Decameron*, written in the wake of the Black Death, around 1350. He describes the total failure of all the social, religious and educational networks in his community, which many people have taken to be true of all medieval society. But we must remember that Boccaccio was writing a work of fiction and describing events of only one plague outbreak in his native city of Florence. Archaeology and written records suggest that a few villages were indeed wiped out, but medieval historians have demonstrated that most communities rebounded within a year of the Black Death's arrival, getting back to business and adapting to a world with dramatically fewer people. At the same time, doctors and scientists immediately tried to fit this new disease into their existing medical frameworks. In both Europe and the Middle East this meant defining the plague in terms of the theory of four bodily humours (blood, phlegm, yellow bile, black bile), first developed by the ancient physicians Hippocrates and Galen and further elaborated by Arabic and Latin physicians in the Middle Ages.

Using these ancient and medieval medical theories, plague doctors argued that the Black Death was a pestilential fever that corrupted the humours, causing the horrific plague buboes, swollen with blood and pus. They recognised that buboes tended to form in the groin, armpits and neck, and explained them as the body expelling humours from the nearest major organs: the liver, heart, and brain, respectively. According to these doctors, plague could be prevented by strengthening the humours or keeping them in balance through a detailed medical plan, or *regimen*, including changes in diet, drugs that caused beneficial vomiting and urination, and prophylactic bloodletting. All of these procedures were intended to remove corrupted humours from the body and to keep black bile (*melancholia*), which was usually considered the most dangerous of the humours, from dominating the body. If a patient did catch the plague, some doctors cautiously recommended lancing the bubo, as seen in a 15th-century image from a book on the plague by Hans Folz, a German barber-surgeon.

Ancient and medieval medical authorities, following the legacy of Hippocrates, also recommended paying close attention to the qualities of the air when explaining epidemic diseases. They didn't need microscopes and laboratories to observe that some diseases seemed to come from within a person while others seemed to spread between people through the air. Plague was clearly contagious, striking entire communities at once, and it thus had to come from outside. Most doctors agreed that this external plague had to come from a corruption of the air itself, a corruption that was eventually known as *miasma* in the Early Modern

Death riding through a medieval town as depicted by *Die Pest* by Arnold Böcklin



In the absence of medical aid, many turned to their faith for protection against the Black Death

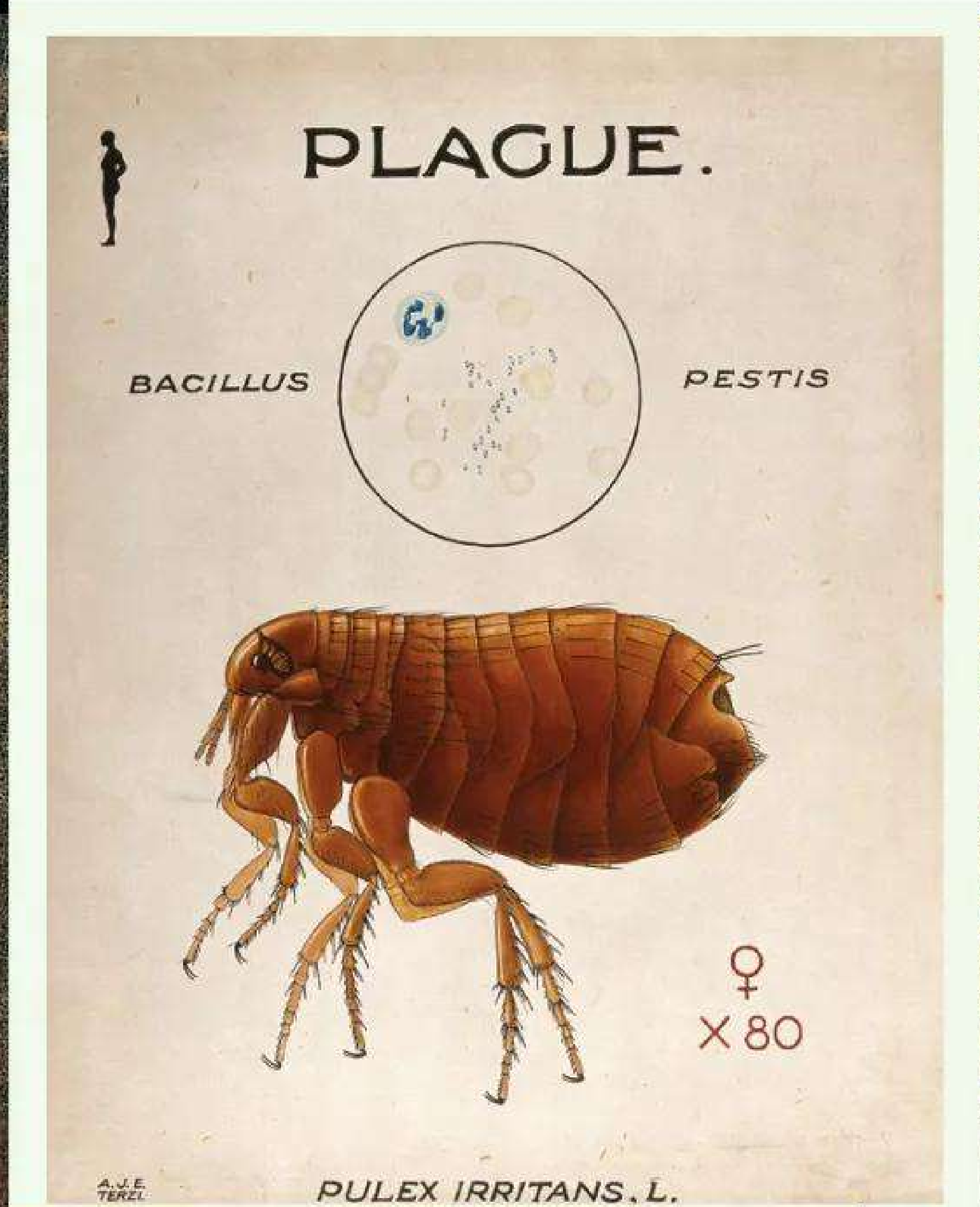
Transporting the dead away from populated areas was an essential task to be performed

WHAT ABOUT "RING AROUND THE ROSIE'?

The famous nursery rhyme is not medieval and not about the Black Death

One of the most common 'facts' that people today know about the Black Death is that medieval people described it in a coded song, 'Ring Around the Rosie' (or 'Ring A Ring O' Roses'). The title supposedly describes circular, reddish plague boils. The "pocket full of posies" protected their bearer from the poisonous miasma, which was thought to carry plague. "Ashes, ashes" is the burning of plague victims' corpses (or in another variant, "A-tishoo, A-tishoo" describes the sneezing of the sick) and "we all fall down" describes the devastation of the disease. The trouble with this common popular theory is that there is no evidence for this rhyme until the 19th century and there is no mention of the claimed secret code behind the rhyme until the 1960s! If we closely compare the rhyme to actual medieval reactions to the plague, none of the pieces fit. Medieval people were much clearer in their descriptions of the disease, they never called the symptoms red or rose-coloured, sneezing was not a symptom of the plague, and they rarely if ever cremated their corpses. The only plausible part of the claim is the "pocket full of posies" because plague doctors did at times recommend holding and smelling flowers to prevent contracting plague. But the belief that the song describes medieval reactions to the plague persists because it fits in with popular ideas about the foolishness and backwardness of medieval people. This popular myth overshadows the complexity of medieval medicine and the contributions of genuine medieval physicians, who provided complex and natural theories for the spread and effects of the plague.

When a plague outbreak would hit a city, many would seek escape in the countryside until it abated



A diagram of the type of flea that spread the bubonic plague, along with the spores of the plague itself

The Great Plague of Marseille was the last major outbreak of bubonic plague in Western Europe

period. Where the plague doctors disagreed was over the original source of miasma. Was it a universal corruption sent directly by God to punish humanity? Was it a poisonous exhalation of the Earth caused by earthquakes opening subterranean caverns? Was it caused by exposed corpses or overflowing swamps? All of these theories were offered to explain the source of the poisonous miasma.

One of the most popular theories was described at length by the Faculty of Medicine at the University of Paris in a letter written to the king of France in 1348, who had asked the professors for their advice as the plague approached the royal capital. These learned authorities combined medicine with astrology, which was generally considered a serious science at that time, to explain the cause and spread of the plague: the air of the Earth, they said, was overheated and corrupted by a 1345 conjunction of the planets Mars, Saturn and Jupiter (all of which were considered hot, violent, or corrupt in its astrological influence) in the zodiac sign of Aquarius (obviously a wet sign). This unnaturally hot and moist air blew across Asia towards Europe, causing plague wherever it passed. When medieval doctors referred to a 'pestilence', they often meant not the disease itself but the poisoned air that engendered the disease in human bodies.

To protect people from the pestilential air, doctors encouraged the wearing or holding of sweet or bitter substances, such as violets, wormwood, vinegar, or (if you were wealthy) a chunk of ambergris, a strongly scented secretion of a sperm whale's intestinal lining. They also recommended burning pitch, incense, or bitter-smelling woods to purge and purify the air. And after the discovery and mastery of gunpowder in the later Middle Ages, they also recommended firing cannons to combat miasma with the gun smoke. In a woodcut from a 1491 medical textbook, *Fasciculus Medicinae*, we can see several of these preventive measures in action: the doctor holds a sponge, most likely soaked in vinegar, to his face, and his attendants hold long torches and an incense burner.

Many educated plague doctors wrote short books, known as plague treatises, to advise their peers and the literate public on plague prevention. They were already publishing these treatises during the Black Death itself. The Spanish physician Jacme d'Agramont wrote the first such work in April 1348. He composed it in his vernacular tongue of Catalan, rather than in the usual educated language of Latin, so that non-professionals could read it. Other early plague doctors include the Bolognese professor Gentile da Foligno, who died of the plague himself in 1348 after writing several casebooks on the subject, and Johannes von Göttingen, a German physician and bishop. It was not just European Christians who wrote about the plague: the Muslim physicians Ibn Khātima and Ibn al-Khatīb, both natives of the Islamicate caliphate of Granada, wrote treatises about the plague, as did the Jewish physician Abraham Caslari of Besalú. Groups of physicians in the faculties of medicine at the universities of Paris and Montpellier teamed up to write authoritative documents about the plague. Regardless of their religious or educational origins, almost all of these plague authors wrote about the same topics: how to identify the astrological and environmental signs of a coming plague; how to avoid the plague by keeping the humours in balance and cleaning one's home or city of potential sources of miasma; and how to treat the plague with herbal remedies, external plasters and bloodletting.

The Evolution of Plague Medicine

By the end of the Middle Ages, usually dated to about 1500, there were more doctors than ever and a greater variety of medical professionals, who could focus on individual patients or epidemic diseases, urban and rural health issues, and local and foreign diseases. Historians of science and medicine also recognise a greater emphasis on detailed observation among Early Modern physicians, an essential feature of the developing Scientific Revolution. Doctors became increasingly adept at distinguishing and describing a wide range of swellings, blotches, fevers and other symptoms on the people in their communities, so they could determine whether an outbreak of disease was actually plague or another epidemic disease, such as typhus, influenza, or dysentery.

This sort of medical observation was made possible through the growth of state-sponsored public health programs aimed at preventing and curing disease throughout large populations. One of the best-known examples of later medieval public health is the establishment of quarantines (from the early modern Italian phrase, *quaranta giorni*, 'forty days') to isolate populations and to keep potentially plague-ridden travellers and ships out of a city. Plague quarantines had been used at least since the 1370s in the wealthy city-states on the Mediterranean Sea, such as Florence, Mantua, Milan, Venice and Ragusa (modern Dubrovnik), but they were not widespread until the later 15th century. For quarantine regulations to be effective, numerous cities and states necessarily had to work together, sending news of plague quickly and being honest about the presence and scope of an epidemic. Quarantine was made more effective through the establishment of permanent plague hospitals or 'pesthouses'. These became a common feature of cities across Europe during the 16th and 17th centuries. Some were built within the city walls, but most were located well outside of a city to isolate confirmed and potential plague patients.

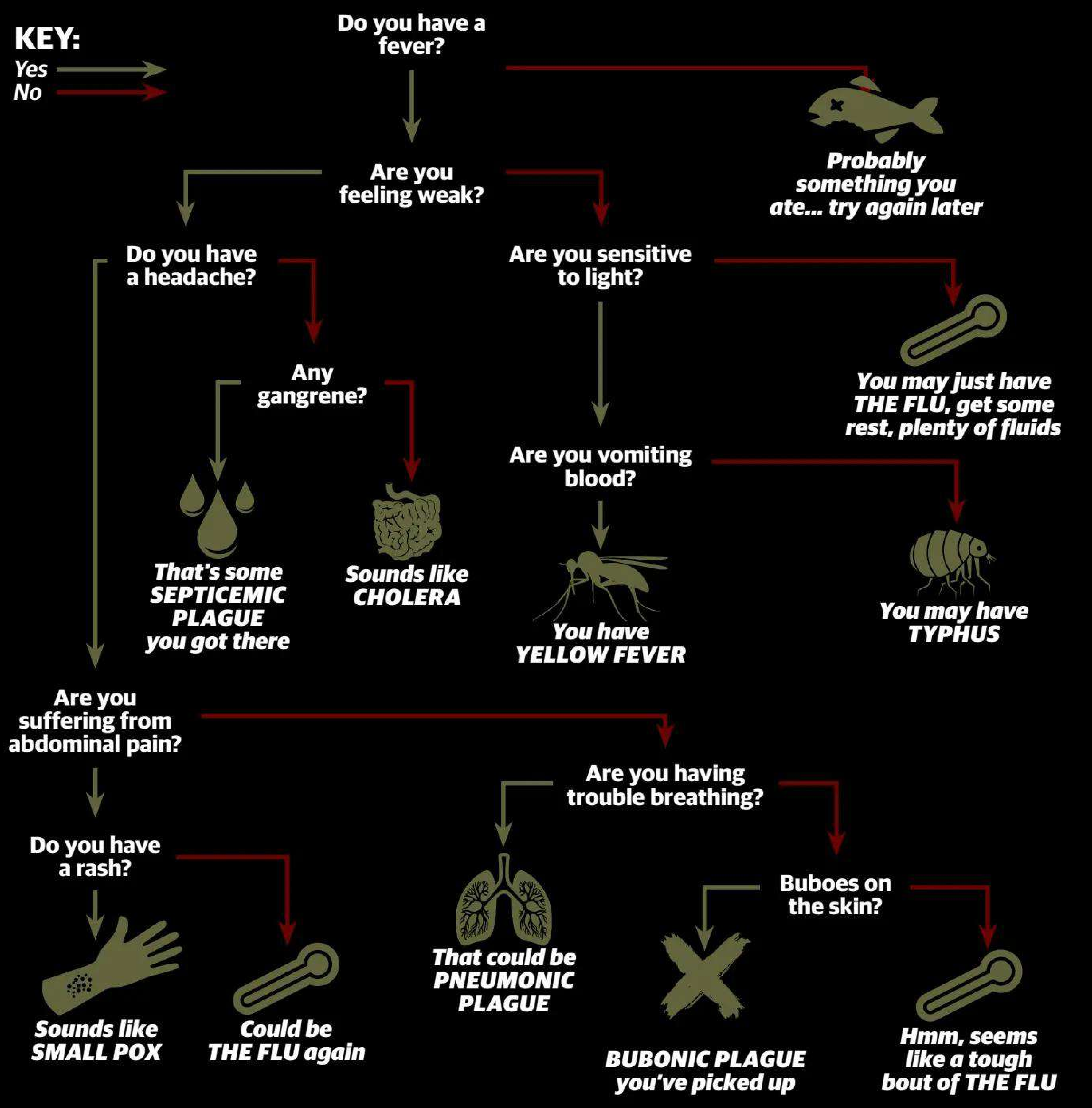
To help monitor and contain epidemic diseases and to run and staff the plague hospitals, first Italian city-states and then royal governments elsewhere in Europe established health boards and hired public physicians. One of the first such boards appeared in 1486, when the Republic of Venice founded a permanent *Provveditori alla Sanità* (Commission on Public Health) to oversee the rapid identification of plague, the deployment of trained physicians, the quarantine of the sick and the careful burial of the dead. Other cities responded much later. The city of Naples created a *Magistrato della Sanità* (Board of Health) in 1656 in reaction to a major outbreak of plague. The entire Kingdom of Naples also funded a royal *Protomedicato*, a medical tribunal that oversaw and licensed pharmacies and town physicians especially in times of plague. The establishment of public health policy did not always work as planned: during the plagues of 1600 and 1625 in London, the College of Physicians refused to help the government of London fight the epidemic, as most of its members fled the city and urged everyone else to do so as well. However, during the Great Plague of 1665, some of the professional London physicians considered it their public duty to stay in the city and treat victims. They volunteered their services as official plague doctors.

The Masked Plague Doctor

After nearly three centuries of treatments, treatises and policies for the plague we finally meet the beaked 'plague doctor', who too often represents the entire history of plague for popular audiences. The first mention of the costume that is so well-known today is found in a work written in the mid-17th century by Charles de Lorme, a royal physician in the service of King Louis XIII of France. De Lorme wrote in his autobiography that earlier in his life, during a 1619 plague outbreak in Paris, he developed an outfit made entirely of Moroccan goat leather, including boots, breeches, a long coat, hat and gloves. The main feature of the

WHAT PLAGUE DO YOU HAVE?

Answer these questions to identify your ailment


KEY:
Yes
No
Do you have a fever?
Probably something you ate... try again later
Are you feeling weak?
Do you have a headache?
Are you sensitive to light?
You may just have THE FLU, get some rest, plenty of fluids
Any gangrene?
Are you vomiting blood?
That's some SEPTICEMIC PLAGUE you got there
Sounds like CHOLERA
You have YELLOW FEVER
You may have TYPHUS
Are you suffering from abdominal pain?
Are you having trouble breathing?
Do you have a rash?
Buboes on the skin?
That could be PNEUMONIC PLAGUE
Sounds like SMALL POX
Could be THE FLU again
BUBONIC PLAGUE you've picked up
Hmm, seems like a tough bout of THE FLU

costume is a tight-fitting mask, fitted with crystal eyepieces, extending into a long beak, about half a foot long, filled with perfume or aromatic herbs. That beak is of course the most famous feature of the costume and essential for the doctor to prevent the inhalation of pestilential miasma.

It is not clear if De Lorme deserves full credit for the invention of the plague doctor outfit, for there are signs of similar plague suits a little before his time. Physicians describing plagues in Grenoble in 1565 and Angers in 1582 mention the use of special hoods to prevent the transmission of pestilential air between the patient and the physician. There is no indication, however, that these costumes also included the long beak. In either case, it is surprising that it took between two and three centuries for physicians to design such an outfit, but it was during that time that physicians came to focus more on theories of interpersonal contagion than on a more universal miasma that could affect entire communities. Wearing these protective costumes suggests that doctors had grown more concerned about catching plague from a patient than from the air itself.

De Lorme left a written description of his plague costume, but our best visual evidence for the beaked plague doctor outfit comes only from the year 1656, when an especially devastating plague killed hundreds of thousands of people in Rome and Naples. At that time, several artists made engravings of the outfit worn by Italian plague doctors. Some of these artists took their subject seriously. For example, the German engraver Gerhart Altzenbach published a popular image of such a plague doctor, with text describing how his outfit protected the wearer against death. Even better known is Paulus Fürst's satirical engraving of a plague doctor, which he copied directly from Altzenbach. He called the image *Doctor Schnabel von Rom*, or 'Doctor Beaky from Rome', and describes how he does nothing but terrify people and take money from the dead and dying. It was Fürst who added some of the elements to the plague doctor that appear in versions of the outfit to this day, such as the claw-like gloves and the pointing stick topped by a bat-winged hourglass. These elements belong to satire and not to historical reality, but they have nonetheless shaped much of how the stereotypical plague doctor is understood today.

The engravings of Altzenbach and Fürst may also have inspired the inclusion of the plague doctor, or *Medico della Peste*, as a standard character of the Italian *commedia dell'arte* since the 17th century. The plague doctor has become one of the most popular costumes in the *Carnevale*, or Carnival of Venice. In fact, some costume historians have argued that the beaked plague doctor was nothing but a fictional and comedic character at first, and that he actually inspired genuine doctors to use the costume during the outbreaks of 1656 and 1720. Without more informative written reports and images, which can help us understand better whether the outfit was actually used, it is impossible to tell which came first: the actual outfit or the Carnival costume. What we do know is that the beaked plague doctor represents three centuries of physicians, scientists and health officials thinking about the spread and prevention of plague. They represent changing ideas about the causes and transmission of disease, about the relationship between doctors and patients, and about the role of the state in protecting public health.

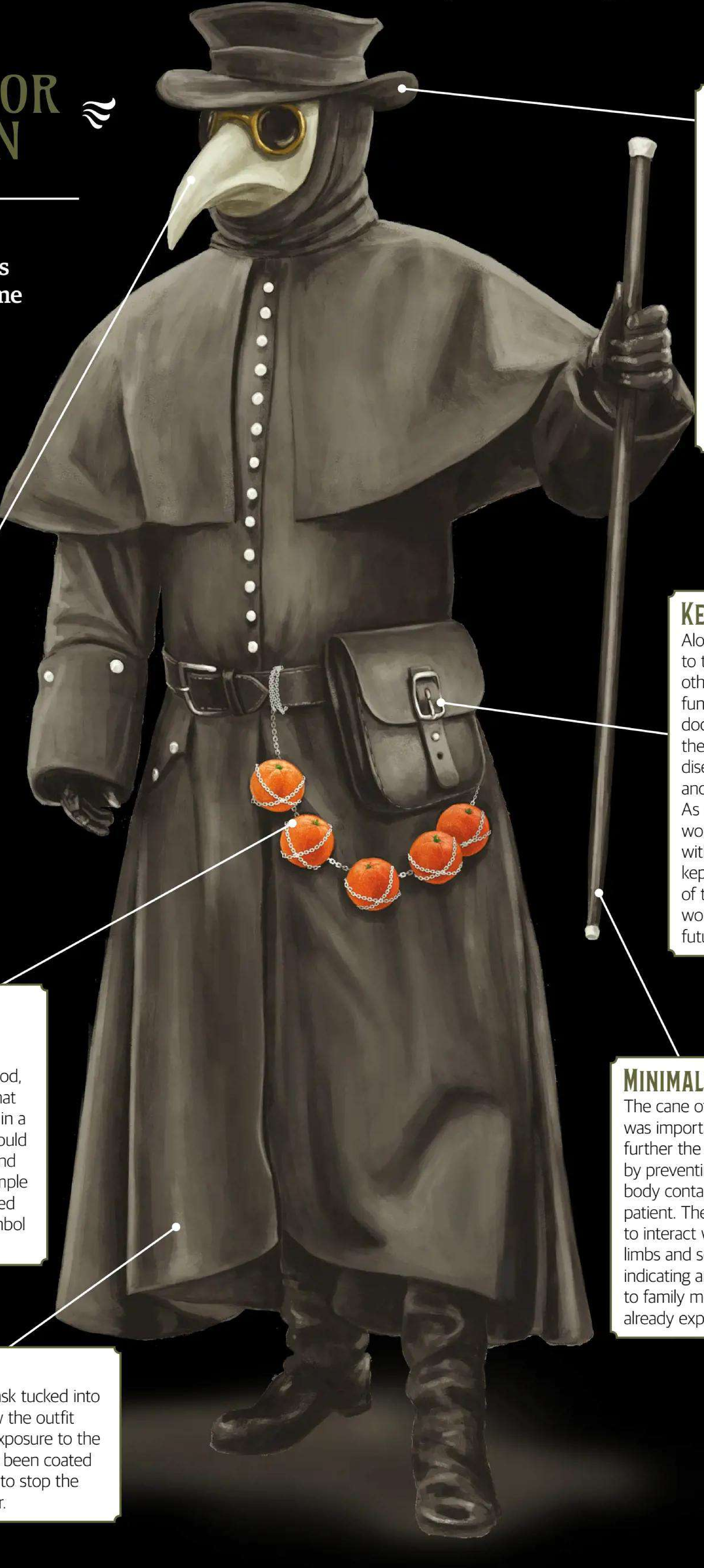
> "THE BEAKED PLAGUE DOCTOR REPRESENTS THREE CENTURIES OF PHYSICIANS, SCIENTISTS AND HEALTH OFFICIALS THINKING ABOUT THE SPREAD AND PREVENTION OF PLAGUE"

Lord have mercy on this house
Lord have mercy on this hovse

During the Great Plague in London, infected households would have red crosses painted on their doors

PLAGUE DOCTOR BREAKDOWN

The key elements and background of the famous 'medico della peste' costume



AVIAN INFLUENCE

There is much debate over the origin of the bird-like mask of the plague doctor. In practical terms the beak was used as a kind of respirator, packed with herbs and oils like mint and lavender to block the bad smells, or miasma as it was known, from infecting the doctor. Symbolically, some suggest that it was inspired by the idea that birds spread the plague so looking like one might draw the sickness out of patients.

THE POMANDER

Since early plague doctors believed that the sickness was spread by miasma (corrupted air) they also thought that good, strong smells could ward it off. So it is that pomanders, citrus fruit, sometimes held in a container with strong scented liquids, would be worn as a protection against illness and the general odours of the street. The simple form of the pomander, an orange studded with cloves, is still used as a gift and symbol at Christmas and New Year.

NO EXPOSURE

The long overcoat with the mask tucked into the collar is an example of how the outfit was designed to reduce skin exposure to the air. The clothing is said to have been coated in suet (animal fat) as a barrier to stop the miasma penetrating the leather.

SYMBOLIC AND PRACTICAL

Many elements of the classic plague doctor costume play both practical and symbolic roles. The entire composition of the outfit is intended to prevent illness from spreading to the physician, but elements like the hat also helped to identify them as medical doctors.

KEEPING NOTES

Alongside attempting to treat plagues the other very important function of the plague doctor was to record the spread of the disease and to bury and record the dead. As such the doctors would have travelled with notebooks and kept extensive records of their patients that would prove useful to future studies.

MINIMAL CONTACT

The cane of the plague doctor was important in minimising even further the risks to the physician by preventing direct body to body contact with a plague patient. The cane could be used to interact with the body, lifting limbs and so forth as well as indicating areas for treatment to family members who were already exposed.

LAZZARETTO ISLANDS

VENICE'S QUARANTINE STATIONS, 15TH CENTURY

The Black Death was spread from victim to victim through fleabites, body fluids and sometimes on the droplets of a cough or sneeze. This meant that major Medieval cities, where the common people lived in cramped and dirty conditions, were a breeding ground for such infections. As commercial hubs, the cities and ports also attracted traders who would either bring the plague with them or catch it while visiting and pass it on while they travelled.

Though the exact cause of the Black Death and how it spread wasn't understood at the time, city burghers did what they could to isolate the sick. Infected houses were locked down, animals were banned from the streets, bodies were hauled into pits, public gatherings were forbidden and trade was halted.

In 1348, the Venetians came up with a plan to prevent the disease from spreading through their population: quarantine. Any vessel that wanted to enter the island city's ports had to spend 40 days anchored offshore to prove that its passengers were not sick – or die trying. In 1403, the citizens went one step further and built a public hospital on the neighbouring island of Lazzaretto Vecchio to isolate anyone that showed signs of plague.

Considered a success, soon more islands in the Venetian Lagoon – like Lazzaretto Nuovo and Poveglia – were being turned into holding pens for potential plague carriers. Rather than staying on their ships, newcomers were encouraged to maroon themselves on these islands while handing over their cargo to be 'decontaminated'. Meanwhile, the waters were guarded by armed patrols and anyone who violated the rules was sent to the gallows.

While Venetians were able to curb the damage as the plague struck Europe, the reality was that being sent to one of these islands was often a death sentence. More than 1,500 skeletons have been unearthed on Lazzaretto Vecchio, and thousands more are thought to be lurking beneath the ground.

GUNPOWDER STORAGE

After the Black Death of 1346-53, plagues came and went across Europe and between outbreaks, the island was used to store gunpowder in two 'torresini da polvere'. This dangerous substance was unstable, so the quarantine islands provided the perfect location for storage away from the healthy population of Venice.

MASS GRAVE

At the height of the plagues of the 14th and 16th centuries, hundreds of people died every day on the islands and the body carriers were overwhelmed. The corpses were piled into mass graves, or plague pits, and it's rumoured that many were buried before they had even died.

DECONTAMINATION

Contemporary medicine believed that the plague was spread by miasma or bad air. In an attempt to tackle this, juniper, rosemary and other herbs were piled up and burnt. Soiled clothes were boiled or coated in vinegar, and the cargo from incoming ships was left in the open air to be 'decontaminated'.

UNSAFE HARBOUR

Plague victims were taken to the island by boat and left on their shores to protect the people of Venice from infection. Incoming ships were also made to wait on one of the islands in case their crew were carrying the disease. The word 'quarantine' comes from the Italian 'quarantina giorni', meaning 40 days – the time ships were made to wait before making port.

Lazzaretto islands

NOBLES' QUARTERS

The island's original facilities had the capacity to hold just over 200 people. Separate quarters were built to house those of higher social status, but the plague was indiscriminate and once they succumbed to the disease they were buried alongside paupers in the same mass graves. Jewellery, coins and combs have been unearthed alongside the bodies.

THE HOSPITAL

There were three types of plague – bubonic, septicaemic and pneumonic – named depending on the part of the body affected. Bubonic plague victims had swollen lymph nodes, septicaemic had blood poisoning with dead and blackened tissue and pneumonic had a bloody cough. The hospital was built in 1423, but with no treatment and little space, patients were piled three or four to a bed.

BELL TOWER

The plague was believed to be a divine punishment, so churches were erected so that prayers could be made for the sick. The bell tower also provided a convenient vantage point from which new arrivals could be monitored. This one was dedicated to Saint Mary of Nazareth, and the island became known as Nazaretum, or Lazzaretto, eventually giving rise to the word 'Lazaret', meaning isolation hospital.

SURVIVOR TRANSFER

Even though plague treatments were primitive, some people did manage to fight off the infection. Those souls who survived their ordeal on Lazzaretto Vecchio (the 'old' quarantine island) were sent to convalesce on Lazaretto Nuova (the 'new' island). Survivors travelled across the water, passing armed patrols and mixing with quarantined sailors and their cargo waiting to be allowed into Venice.

ARTIFICIAL ISLAND

The plague islands were located in the inland sea surrounding Venice, which is littered with submerged mudflats. When the tide went out, more land was revealed beneath the water and, as the demands on the island increased, this hidden space was reclaimed to accommodate more buildings, giving the island its distinctive artificial outline.

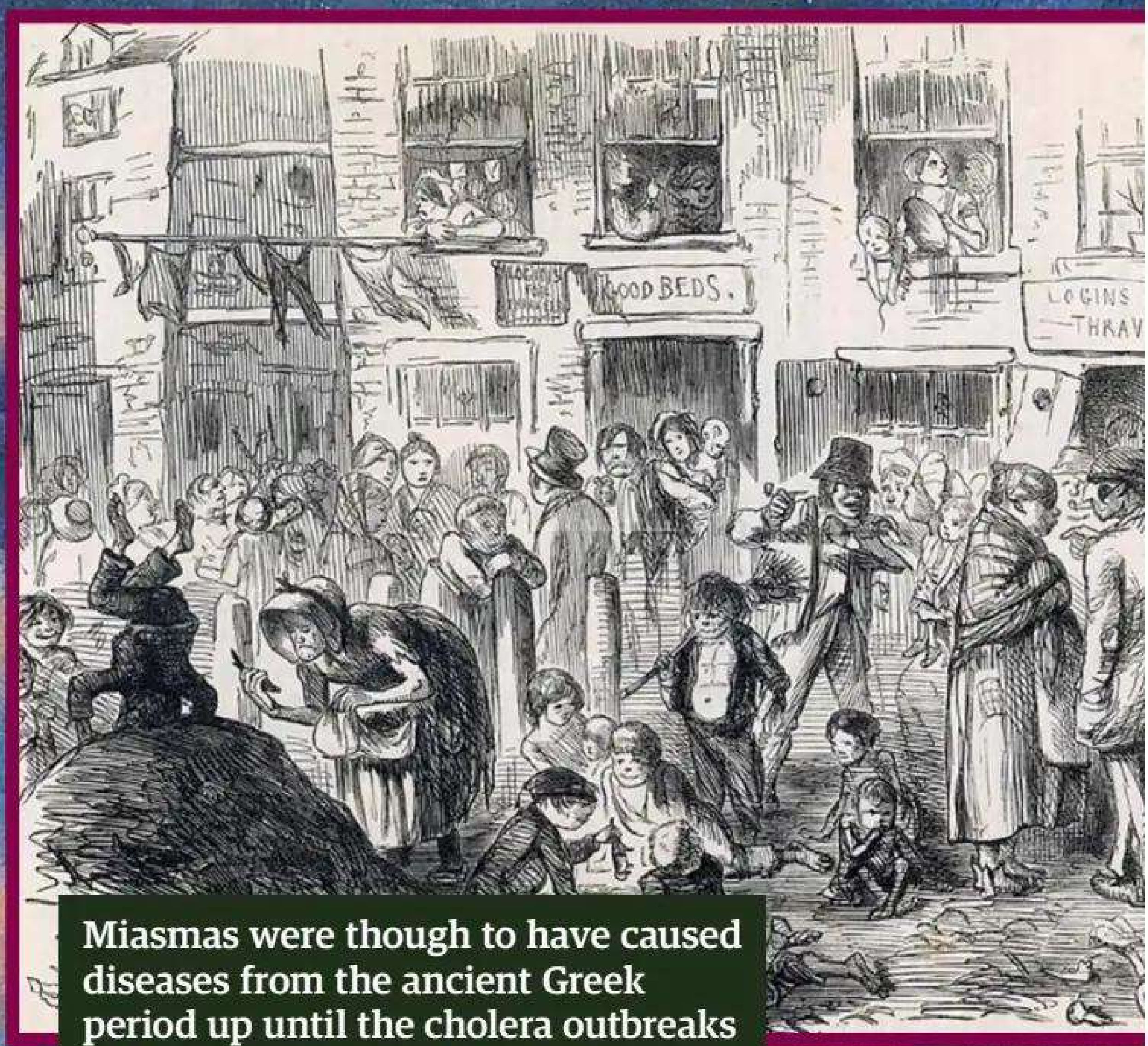
STAFF QUARTERS

Plague treatments were experimental and based on the best science of the day, which revolved around the idea that the body was filled with four humours – blood, phlegm, yellow bile and black bile – and that sickness resulted from them becoming imbalanced. The hospital's doctors would have attempted to rebalance their patients by bloodletting, and its body carriers would have been responsible for collecting and burying the dead.

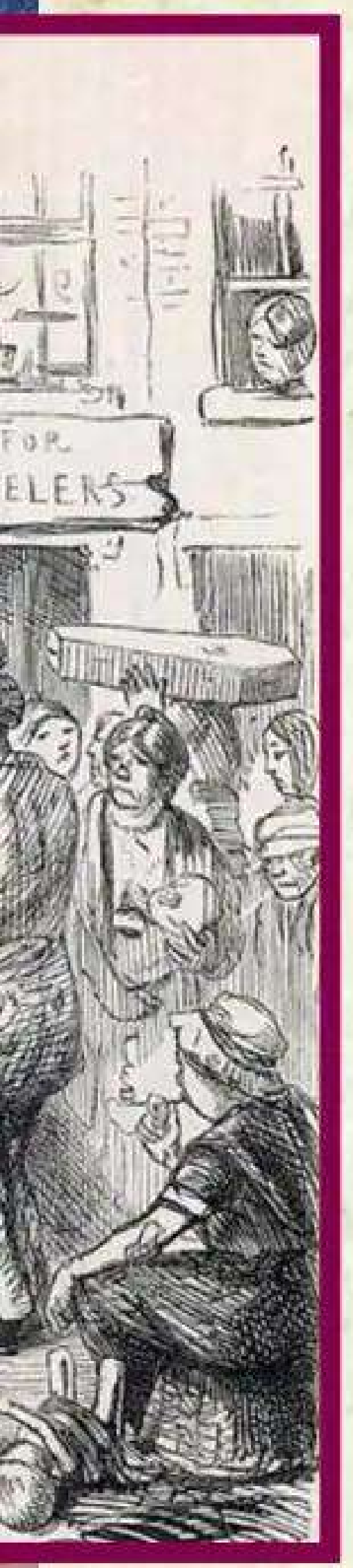
© Adrian Mann

A visit from the plague doctor and the mass-burning of dead bodies happened during the medieval era as society struggled to prevent the spread of disease

The word quarantine originates from Italian. In Venice during the Black Death, new arrivals would be isolated for 40 days at a time



Miasmas were though to have caused diseases from the ancient Greek period up until the cholera outbreaks in London in the mid 19th century



MIASMAS: SMELLS THAT CAUSE DISEASE

The long-standing theory that disease spread through foul air was believed by many before the existence of germs was proved

Words Jack Griffiths

Miasmas were the disgusting smells that caused disease. At least, this was the medical philosophy in the medieval period. The word 'miasma' originates from the ancient Greek for 'to stain' and the theory originated through the Greek and Roman physicians, Hippocrates and Galen. It was believed that illness was spread via the poisoning of people by foul stenches. Bad odours commonly came hand-in-hand with disease, resulting in the misconceived principle that disease was caused by smells. The supposed causes of miasmas ranged from bad air escaping from the ground after earthquakes and the planets being out of alignment to them being released as a punishment by God. Miasmas were believed to cause all manner of disease from plague to malaria to cholera. A common symptom of these illnesses was sweating, which was meant to be a sign of an inhaled miasma.

The false belief did benefit healthcare to a small extent as, to avoid it, people stayed away from where the vapour was coming from. For example, in Venice during the Black Death, sailors on ships arriving from already-infected areas were segregated for 40 days. This inadvertently slowed the spread of disease as germs could not be transmitted from those already infected on the vessel. Additionally, to eliminate bad fumes, areas were cleaned and ventilated and the dumping of waste banned, decreasing the spread in some circumstances by reducing the amount of disease-carrying rats and improving public health in general by cleaning up water supplies. However, the idea that miasmas were carried through the air, prevented people from more rapidly understanding that diseases could also be carried through water and direct contact as well as through the air.

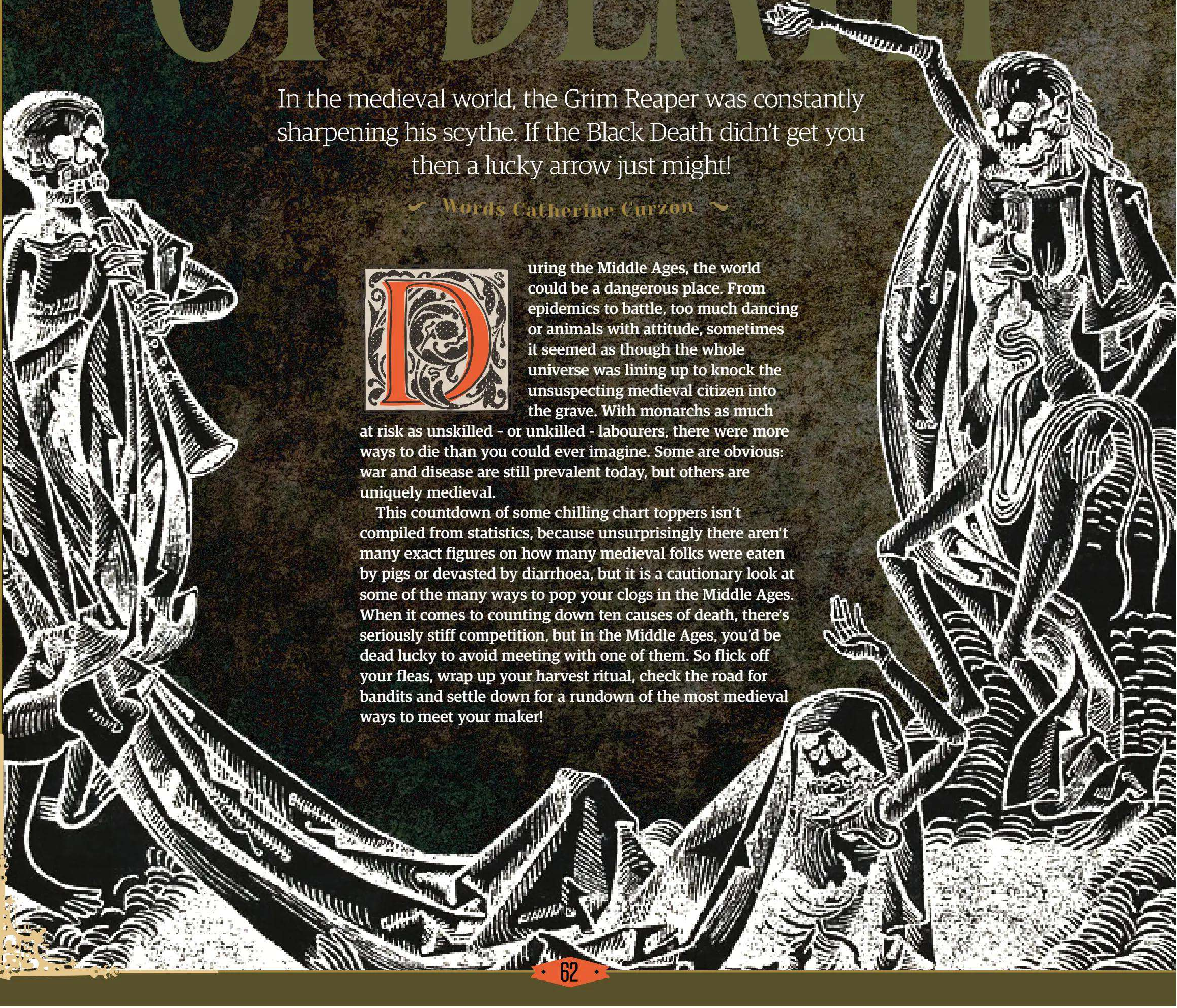
During the Black Death, the quarantined sick would be visited by masked and cloaked plague doctors. Their beak-like masks would be stuffed with sweet-smelling flowers and herbs to diffuse the air of its toxins before it reached their nose and mouth. Plague doctors came equipped with a long cane that allowed them to keep their distance from patients while examining them. Loud sounds like ringing church bells and birds chirping were also believed to 'keep air moving'. Ultimately, people understood that disease was contagious, they just didn't know what spread it. The idea of miasmas stayed in common medical thought until the 19th century when it was superseded by germ theory after the discovery of microorganisms by French microbiologist Louis Pasteur in the mid 1800s.

TOP 10

CAUSES OF DEATH

In the medieval world, the Grim Reaper was constantly sharpening his scythe. If the Black Death didn't get you then a lucky arrow just might!

Words Catherine Curzon

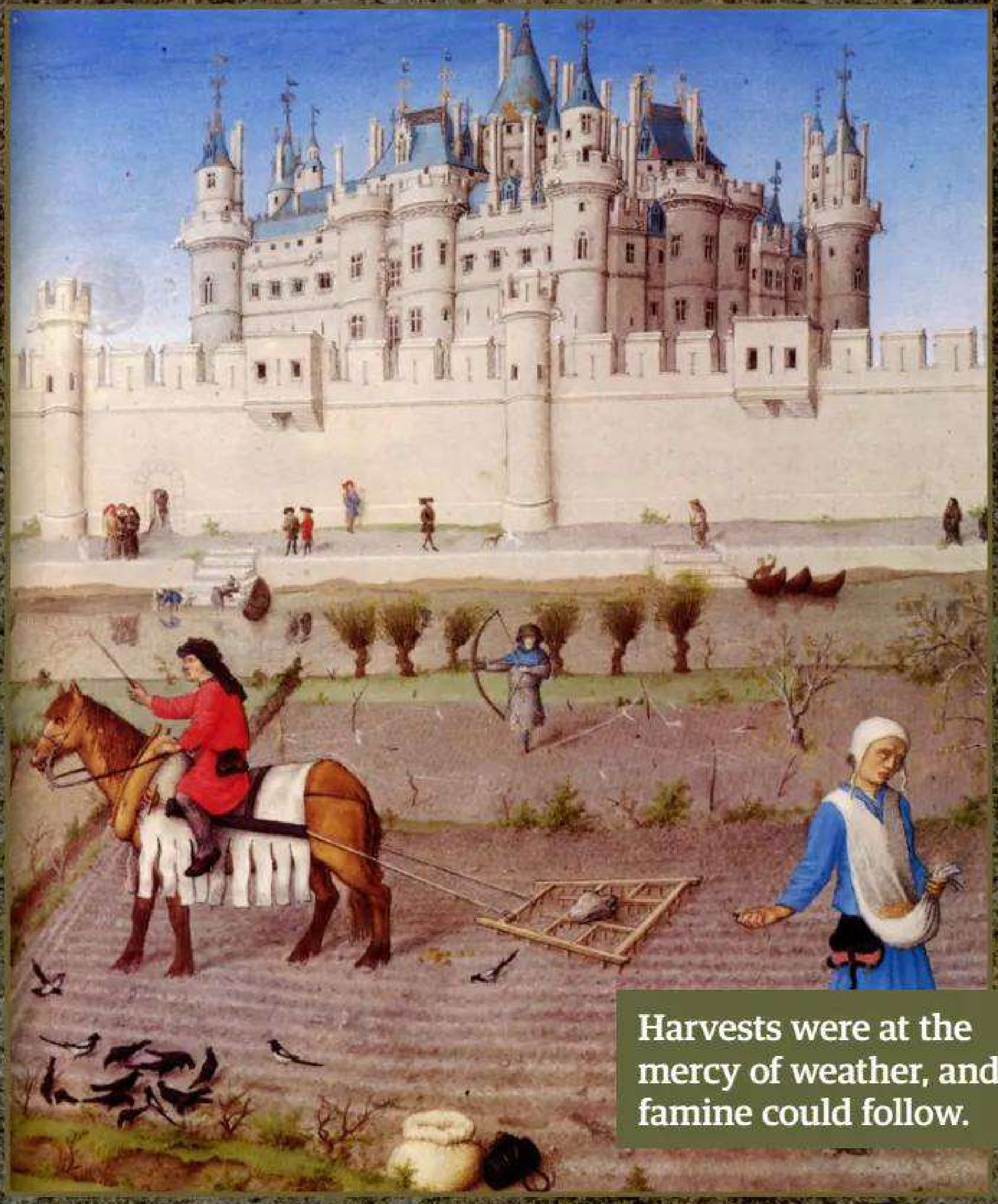


During the Middle Ages, the world could be a dangerous place. From epidemics to battle, too much dancing or animals with attitude, sometimes it seemed as though the whole universe was lining up to knock the unsuspecting medieval citizen into the grave. With monarchs as much at risk as unskilled - or unkilled - labourers, there were more ways to die than you could ever imagine. Some are obvious: war and disease are still prevalent today, but others are uniquely medieval.

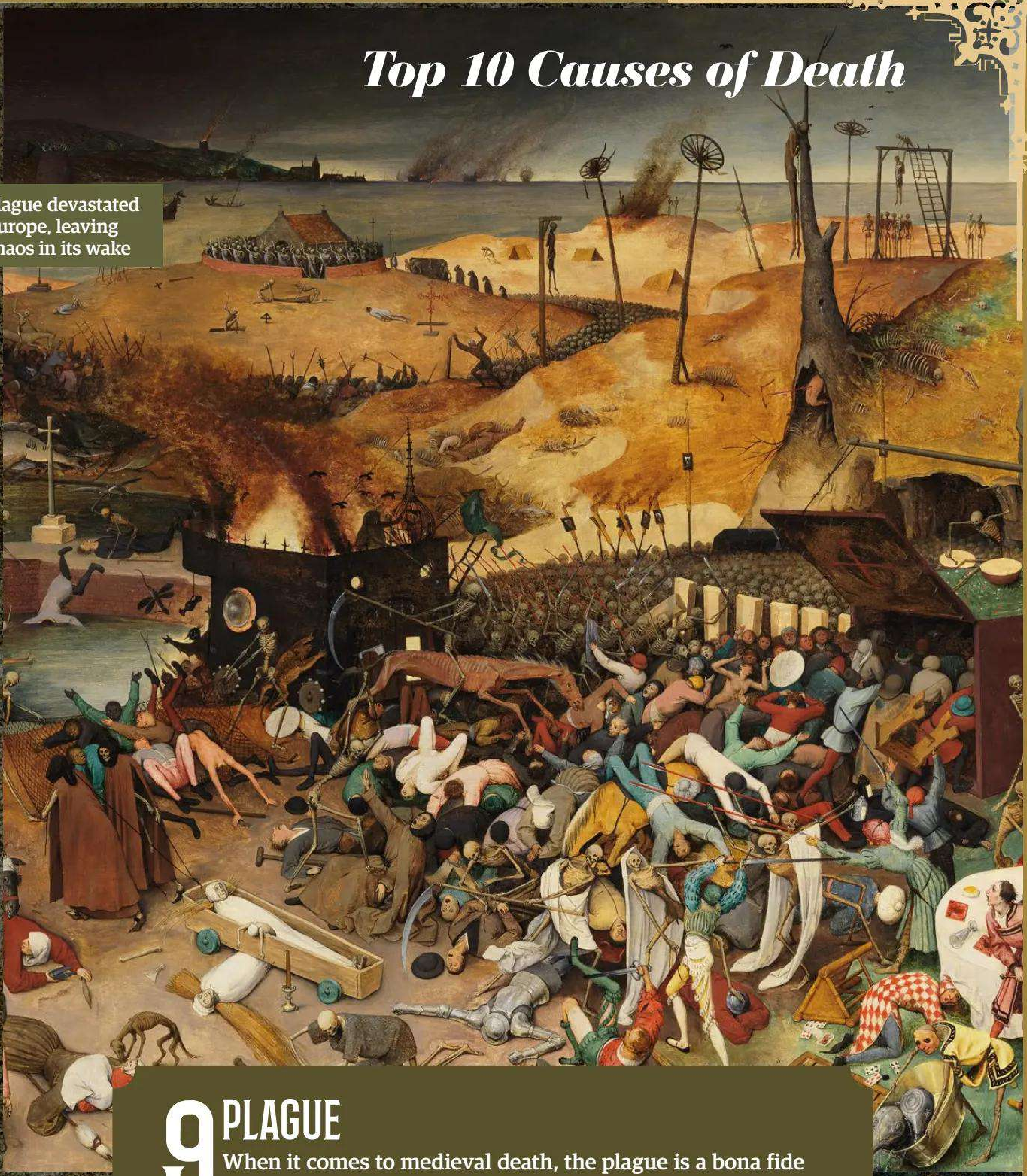
This countdown of some chilling chart toppers isn't compiled from statistics, because unsurprisingly there aren't many exact figures on how many medieval folks were eaten by pigs or devasted by diarrhoea, but it is a cautionary look at some of the many ways to pop your clogs in the Middle Ages. When it comes to counting down ten causes of death, there's seriously stiff competition, but in the Middle Ages, you'd be dead lucky to avoid meeting with one of them. So flick off your fleas, wrap up your harvest ritual, check the road for bandits and settle down for a rundown of the most medieval ways to meet your maker!

10 WEATHER WOES

Keep watching the skies, because in the Middle Ages bad weather didn't just spoil a picnic, it could be deadly. A washed-out or chilly summer meant a failed harvest and a failed harvest meant hunger, disease or, in the worst cases, famine and death. Little wonder that medieval folks followed harvest rituals to ensure the success of their harvests and even kept an eye out for witches to blame when things went wrong!



Harvests were at the mercy of weather, and famine could follow.



Plague devastated Europe, leaving chaos in its wake

9 PLAGUE

When it comes to medieval death, the plague is a bona fide superstar. This infamous killer stalked Europe for centuries, cutting down millions in its wake. Carried by flea-infested rats, this heaviest of heavy-hitters enjoyed comeback after comeback, popping up all over the world and wreaking havoc. Whether exhibiting the telltale buboes of the Black Death or catching the pneumonic plague from a simple sneeze - bless you - the unsuspecting people of the medieval world didn't stand a chance.

> "WHEN MEDIEVAL PEOPLE WENT TO WAR, THEY ENCOUNTERED YET MORE WAYS TO DIE"

Looking for almost guaranteed death? Then head for the medieval battlefield

8 BATTLEFIELD BLOODSHED

There was little that medieval movers and shakers liked more than going to war. And when they went to war, they encountered yet more ways to die. With everything from local land wars to major battles and even blood feuds popping up all over the land, it was a worryingly common way to go. The dubious honour of being the bloodiest battle in the history of medieval England goes to the Battle of Towton in 1461. During this battle in the Wars of the Roses, 28,000 combatants went to the baggage train in the sky!

7 HORRIBLE HUNTING HAPPENINGS

Ah, hunting, that favourite pastime of the medieval rich. What better way to pass a few hours than to go out and kill some innocent animals? And in a sport that requires both sharp things and wild beasts, what could go wrong? King William II could certainly tell you, had he not been "accidentally" shot by an arrow during a hunting trip in 1100. The moral of the story? Choose your hunting buddies carefully.

6 DASTARDLY DYSENTERY

Far from the most glamorous way to shuffle off this mortal coil, dysentery wasn't choosy about who it carried away in its fetid hands. "The flux", as it was known to medieval people, saw a boom in evacuations that would've given pandemic loo roll hoarders something to worry about and even slayed a sovereign. Though rumour had it that King John here gorged on peaches and paid the price, in reality it was dysentery that claimed the life of the controversial king as he strained on his medieval toilet. What an epitaph for the ages!

5 SAYING THE WRONG THING

In our social media world, we all know that saying the wrong thing can be disastrous. But in the Middle Ages, speaking out of turn wouldn't just get your socials shut down, it could lead you to a violent end. Speaking your mind was a dangerous business and if you criticised the religious status quo, a charge of heresy wouldn't be far behind. In a world of holy wars and Inquisition, heretics faced pursuit and persecution, ending in torture or even execution. Now that wouldn't look too good on your Insta grid, would it?

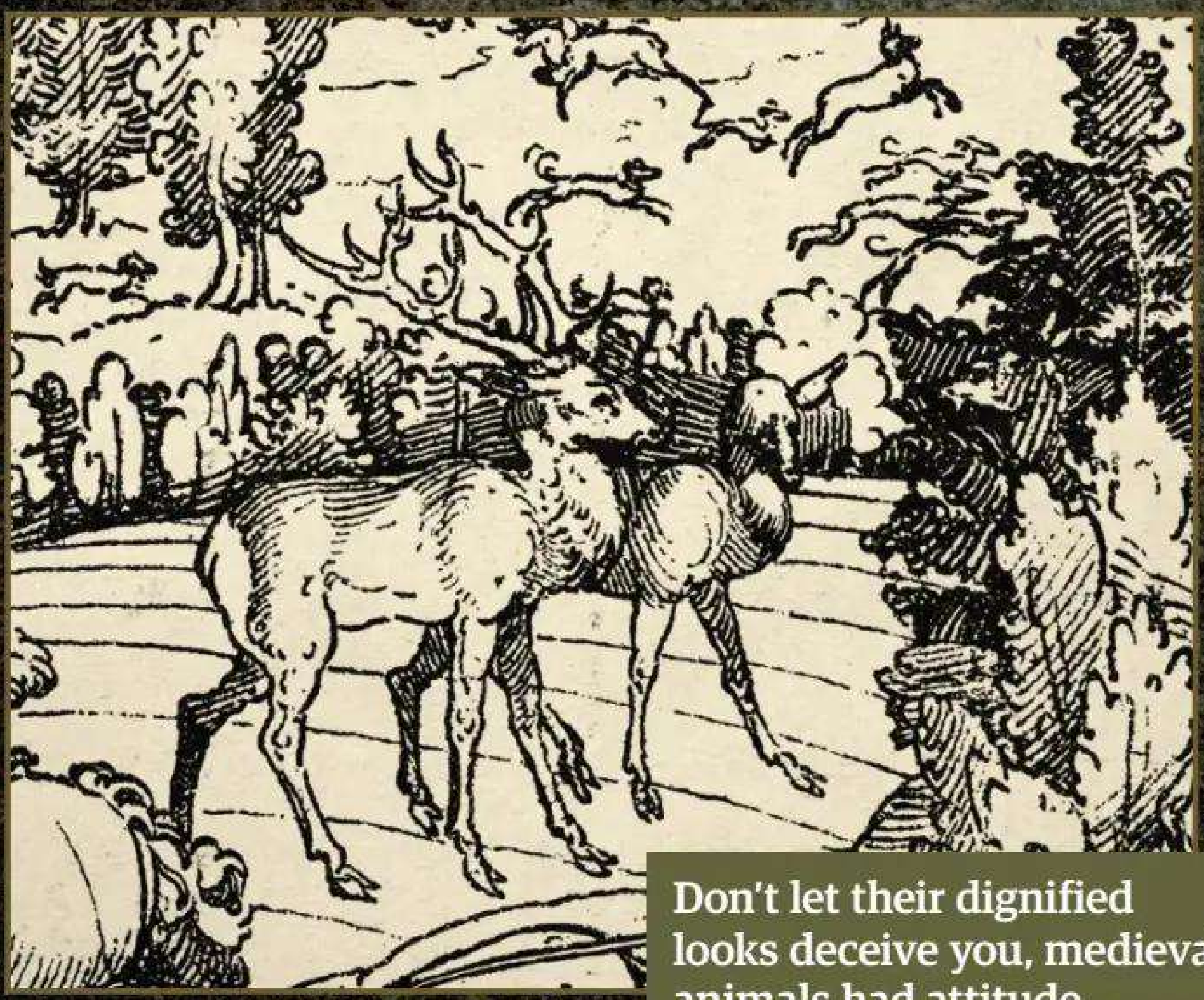
A roadtrip wasn't just an adventure… sometimes, it was a death sentence

4 TRAVELLING TRAUMAS

With the Black Death, war and famine stalking the land, it might be nice to get away from it all. But for medieval travellers there was no such thing as first class. The world was a dangerous place, and safe lodgings were few and far between, whilst sea travel could be a death sentence. Even a short journey was fraught with danger, as bandits lurked along the road just waiting to spoil the trip.

3 ANIMALS WITH ATTITUDE

Whether tumbling from your horse, tangling with wild beasts or getting devoured by pigs like poor Perrinot Muet in 1379, medieval animals were anything but cute and cuddly. Just ask Byzantine Emperor Basil I, who was killed when a stag he was hunting snagged his belt on its horns and dragged him for more than ten miles! Oh, it didn't end well for the killer pigs either: they were tried and sentenced to death.



Don't let their dignified looks deceive you, medieval animals had attitude

2 SWEATING IT OUT

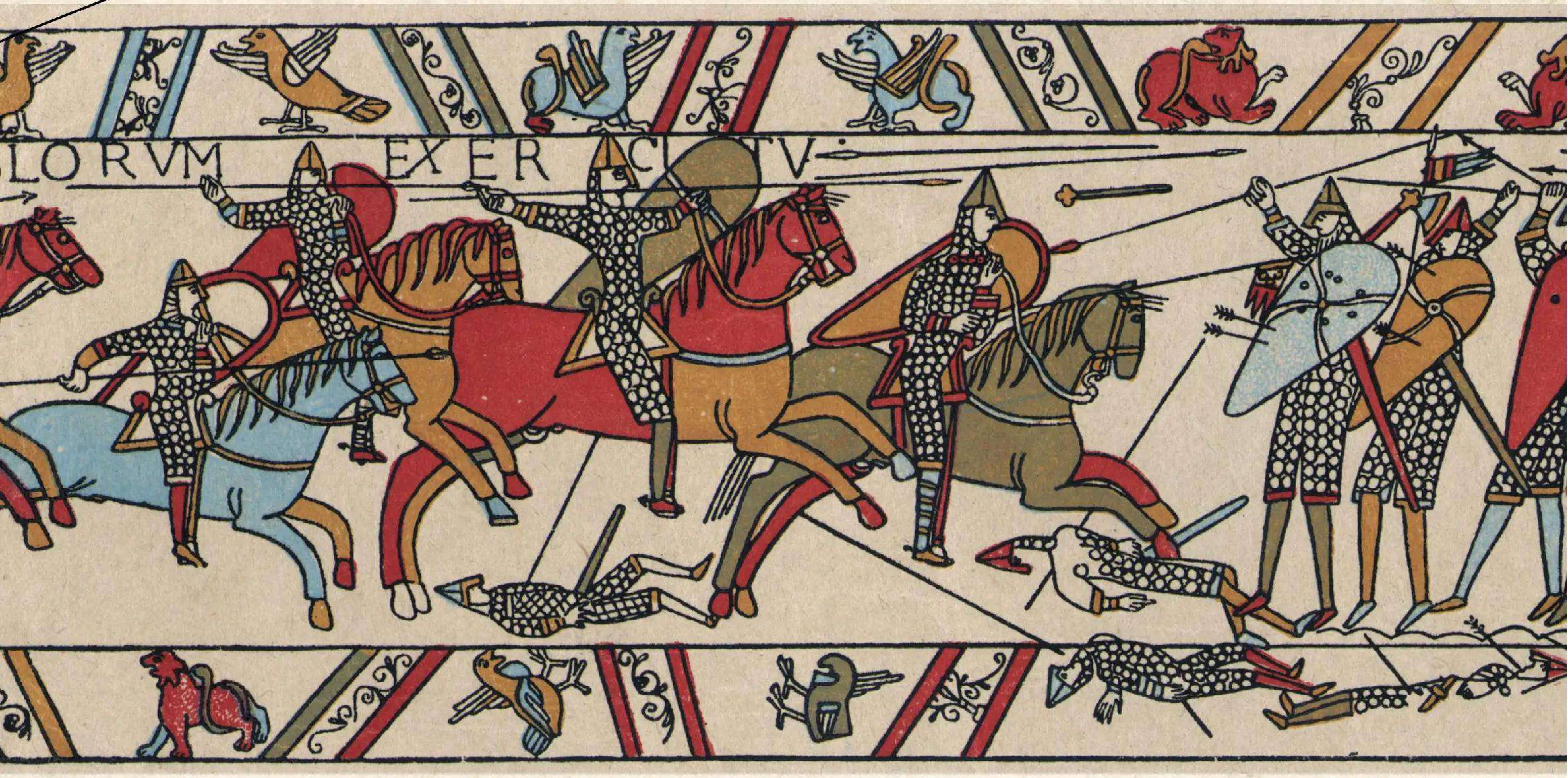
When it comes to icky ways to die, even the strongest antiperspirant wouldn't spray away the danger of the sweating sickness as it spread across England in the 1500s. With symptoms ranging from fever to exhaustion, the mysterious and highly contagious disease hung around for just 24 hours before the patient either recovered or died. And guess what? Survival didn't guarantee future immunity, because the Grim Reaper likes to keep folk on their toes.

With little chance of survival, patients had to sweat it out

1 DANCING 'TIL YOU DROP

But when it comes to keeping you on your toes, how about dancing yourself to death? There's been some seriously stiff competition, but the top spot in our macabre countdown goes to the medieval dancing plagues that swept the continent in the Middle Ages. In 1374, hundreds of people crowded into the streets of Aachen in Germany and began throwing shapes; soon, many more had joined them all over Europe. And that was just the start; for more than a century dancers could be found flinging their bodies around and not stopping until they fell down dead from the sheer exhaustion of it. Saint John's Dance, as the condition became known, has been blamed on everything from mass hysteria to demonic possession and, more recently poisoning by psychotropic mould. Whatever lay behind it, this literal dance of death is dead certain to top the charts when it comes to uniquely medieval ways to turn up your toes.

Dance until you drop... literally!



BATTLE SCARS AND

FIELD MEDICINE

With warfare an occupational hazard, medieval soldiers were often in need of anything from a swift bit of stitching to a surgeon with a saw!

Words Catherine Curzon

For a medieval soldier, making it off the battlefield might be the least of their worries when it came to survival

The medieval world holds a curious and romantic fascination for many, with tales of knights in shining armour, thrilling jousting contests and valiant battles, ideally for the hand of a fair maiden or the honour of a kingdom. It'll come as no surprise to learn that the real thing wasn't quite as dashing as fiction makes it seem; in the Middle Ages, warriors were more likely to meet a barber-surgeon with a bone saw than a swooning princess. It was a time of war and bloodshed and, rather unfortunately, a time before modern medicine and surgical techniques. Yet in a time where violent battles were an occupational hazard, patching up soldiers so they could go back to the field was an essential skill.

In early medieval combat, the wounded would be left where they fell as the fight raged around them. Only once the smoke of battle cleared would survivors – if there were any – be gathered up and taken to the nearest place where care could be provided, often a monastery. However, as the years passed and efficiency became ever more important, armies began to travel with their own physicians and surgeons; in the largest and best equipped these often amounted to field hospitals. These impressive set-ups could boast a team of physicians and surgeons, as well as a baggage train rich in extensive medical supplies and equipment. For the more humble, of course, the reality could be nothing but a quack or two armed with a rusty blade and a roaring fire.

Soldiers and their contemporaries relied for their care on barber-surgeons, men who followed the troops and provided treatment for injuries sustained in battle. Whilst physicians were on hand to treat other maladies, when it came to surgery of all types, it was to the barber-surgeons that soldiers turned. Higher ranking men employed their own surgeons to travel with the army and could expect to receive immediate care; for the majority, however, this was not the case.

In many cases, particularly when it was delivered on the edge of a chaotic battlefield, medical care was perfunctory. With medieval weaponry dealing some pretty savage blows, injuries were frequent and often fatal; even if the casualty survived the first onslaught, the treatment alone might be the death of him and of course, anaesthetic was wanting and sterile environments and equipment non-existent. However, experience had taught surgeons that a person who is writhing in agony or senseless with panic is not easy to treat, so they did make an effort to ensure that their patients were anaesthetised to some degree before more extreme procedures were attempted. If a knight was lucky and had the money or connections to afford a more forward-thinking caregiver, he might be given copious amounts of alcohol or even a jolt of something containing opium, but with supplies short and expensive these methods would be reserved for those who really needed them. In one or two cases, a knock on the head might render the patient unconscious

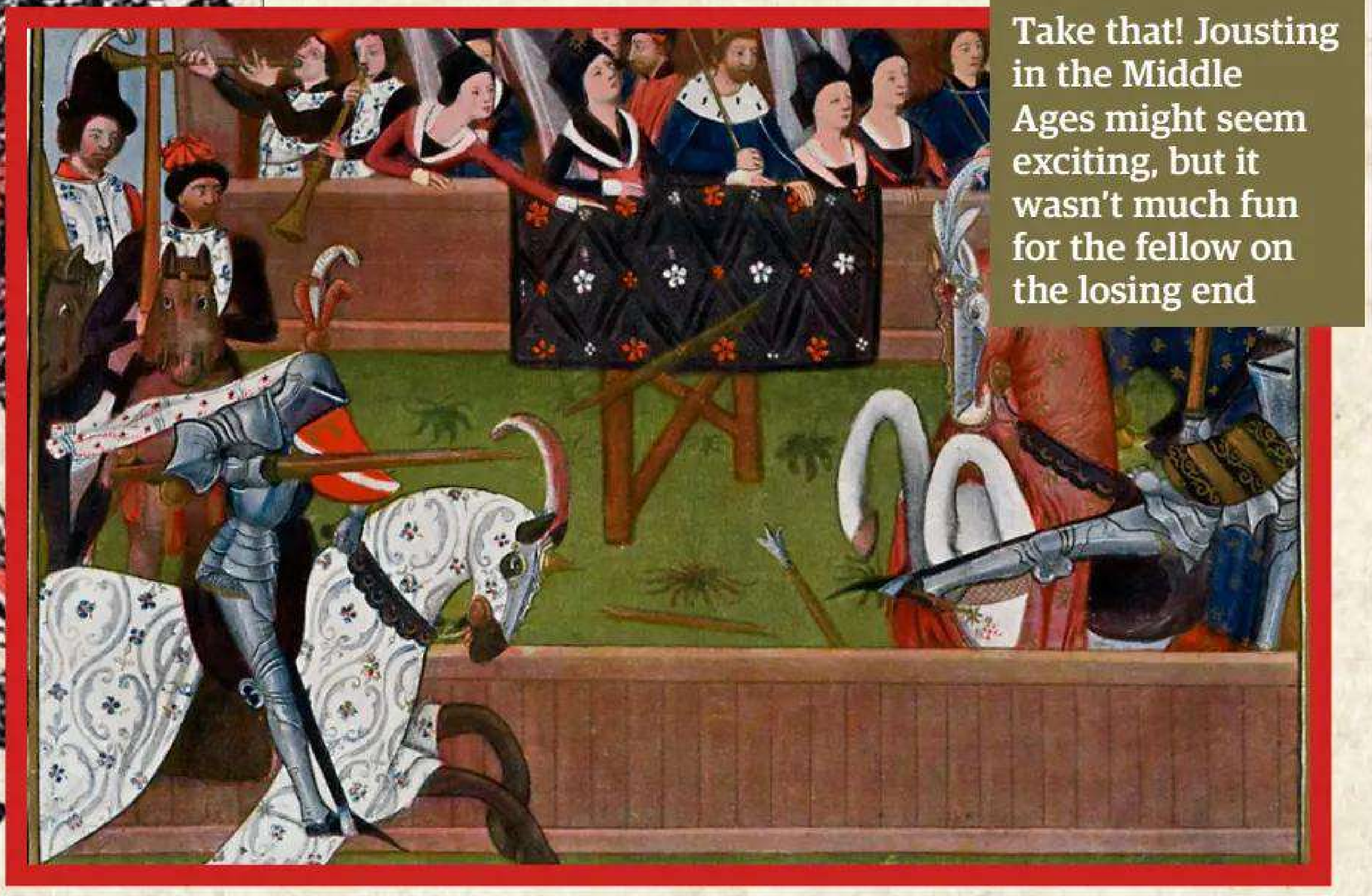
If amputation was the only option, a patient could only hope for a sharp, clean saw, and a surgeon with a swift and steady hand

long enough for the operation to take place whilst for others, they simply had to bite down on something and ride out the pain.

Today, the thought of amputation or other surgery without being sedated or at least numbed with local anaesthetic is unthinkable, but that's precisely what medieval battlefield medicine entailed. In often chaotic circumstances surgeons would tend their patients, amputating mangled limbs with a saw, or stitching, dressing and cauterising wounds. Cauterisation, sealing the end of the amputated limb or other injury with a cautery – a hot iron that had been heated in a fire – was a risky and agonising procedure, but it worked. At least, as long as no infection set in; mindful that this could be deadly in itself, some practitioners used alcohol and St John's Wort as antiseptic agents, whilst others employed honey when it came to dressing and poulticing wounds.

Whilst medics in the Middle Ages understood that things should be kept clean as far as possible, with no sterilisation, and surgery often happening practically on the battlefield itself, this was next to impossible. Instead, the name of the game was speed and, with casualties pouring in thick and fast, there was little time for anything but the necessities. Open wounds were washed and stitched with a needle and catgut, bandaged or cauterised; broken limbs, meanwhile, could well be splinted and set but, if smashed beyond repair, out came the saw and off came the limb. Medieval texts even contain stomach-churning descriptions of surgical attempts to treat skull fractures and head injuries by trepanning – making a hole in the skull to relieve pressure – many of which ended in disaster for the patient.

Arrows were an occupational hazard and getting them out could do more damage than the arrow itself. If it was deeply embedded, a surgeon might cut the flight and stem off and push the arrowhead through until it could be drawn out the other side, hopefully without hitting anything vital on the way. If that wasn't possible, the arrow could be cut out. A quack might well just yank the arrow right out, causing additional trauma, whilst a more sensitive surgeon would attempt to soften the flesh around the arrowhead until the arrow could be gently worked free. Neither was an easy ride.



Take that! Jousting in the Middle Ages might seem exciting, but it wasn't much fun for the fellow on the losing end

Battlefield injury and illness was no joke; survival might depend on the skill of the surgeon waiting to patch up your wounds

Even away from the battlefield, the romantic ideal of the medieval knight was not without its risks. Take, for instance, the dashing jousting match and the very real risk of injury. Whilst many of these would likely be minor cuts and bruises, broken bones and open wounds were a distinct possibility. What started as sport could soon turn fatal and, just as in battlefield medicine, whilst a herbal poultice could be applied for more minor injuries, unsterilised catgut sutures would be used to stitch up wounds sustained during jousts. Ironically, the suture itself might be the very source of an infection that could prove far more ruinous than the initial injury.

Whilst physical injury was an ever-present risk for knights and soldiers in the Middle Ages, disease could wreak havoc with health too. Medieval sieges were often long drawn out affairs and for those on either side of the wall, illness was a constant danger. Crammed together in cramped and rudimentary conditions with the barest minimum of hygiene, besieging armies fell prey to typhoid and dysentery, whilst securing fresh food and water was increasingly difficult as the siege wore on. Additionally, sieges inevitably meant death and as corpses piled up and graves were dug and filled in haste, the stench and risk of infection only grew. At the Siege of Harfleur in 1415, more English and French soldiers were killed or laid low by dysentery than by actual combat, and once an illness entered an encampment, there was no way to stop its spread. Add to that the fleas and other pests that were rife, and life on either side of the fortifications was miserable.

Once disease infiltrated a camp, little could be done to halt it. Whilst some commanders attempted to position their armies in locations that allowed for a sensible spread of tents, a fresh water supply and plenty of space between the food, water and latrines, this could not always be maintained if a siege became prolonged. A protracted deadlock could ruin even the best laid plans and as soon as dysentery or a similar disease began to infect the soldiers, it could spell disaster.

In a time when anaesthetic was virtually unheard of and basic hygiene in battlefield and siege medicine could be wanting, the medieval soldier faced an uncertain future. A visit to the surgeon carried with it torments and risks of its own. Of course, for the wealthy and fortunate who could afford to travel with their own handpicked medics, there might be a fighting chance. The majority, however, had no choice but to place themselves in the hands of the barber-surgeons; some of these were skilled practitioners and some were quacks, but for everyone, there were always risks associated with battlefield and siege medicine. As some soldiers found to their cost, it might not be the battle that killed them, but the men they turned to for help.

“ARROWS WERE AN OCCUPATIONAL HAZARD AND GETTING THEM OUT COULD DO EVEN MORE DAMAGE”

GANGRENE AND WOUND FEVER

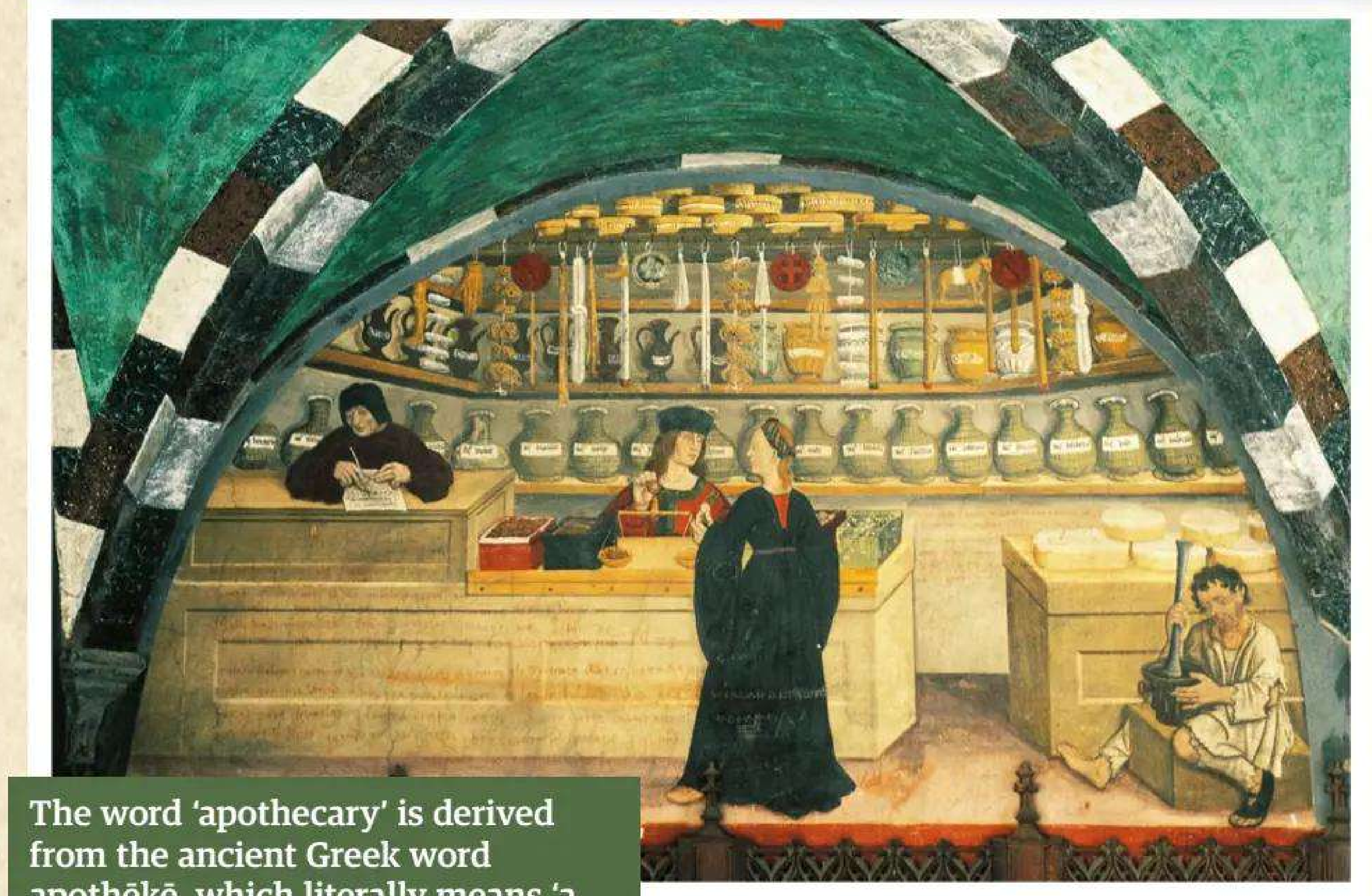
The smallest cut could pose a potentially deadly danger

One of the biggest risks associated with battle wounds in medieval times was wound fever, better known today as the potentially deadly condition of sepsis, namely blood poisoning. With antiseptic limited and sterile equipment unheard of, physicians in the Middle Ages used a variety of natural antiseptics such as St John's Wort, vinegar or alcohol to clean a wound and, their patients hoped, stave off the fatal fever.

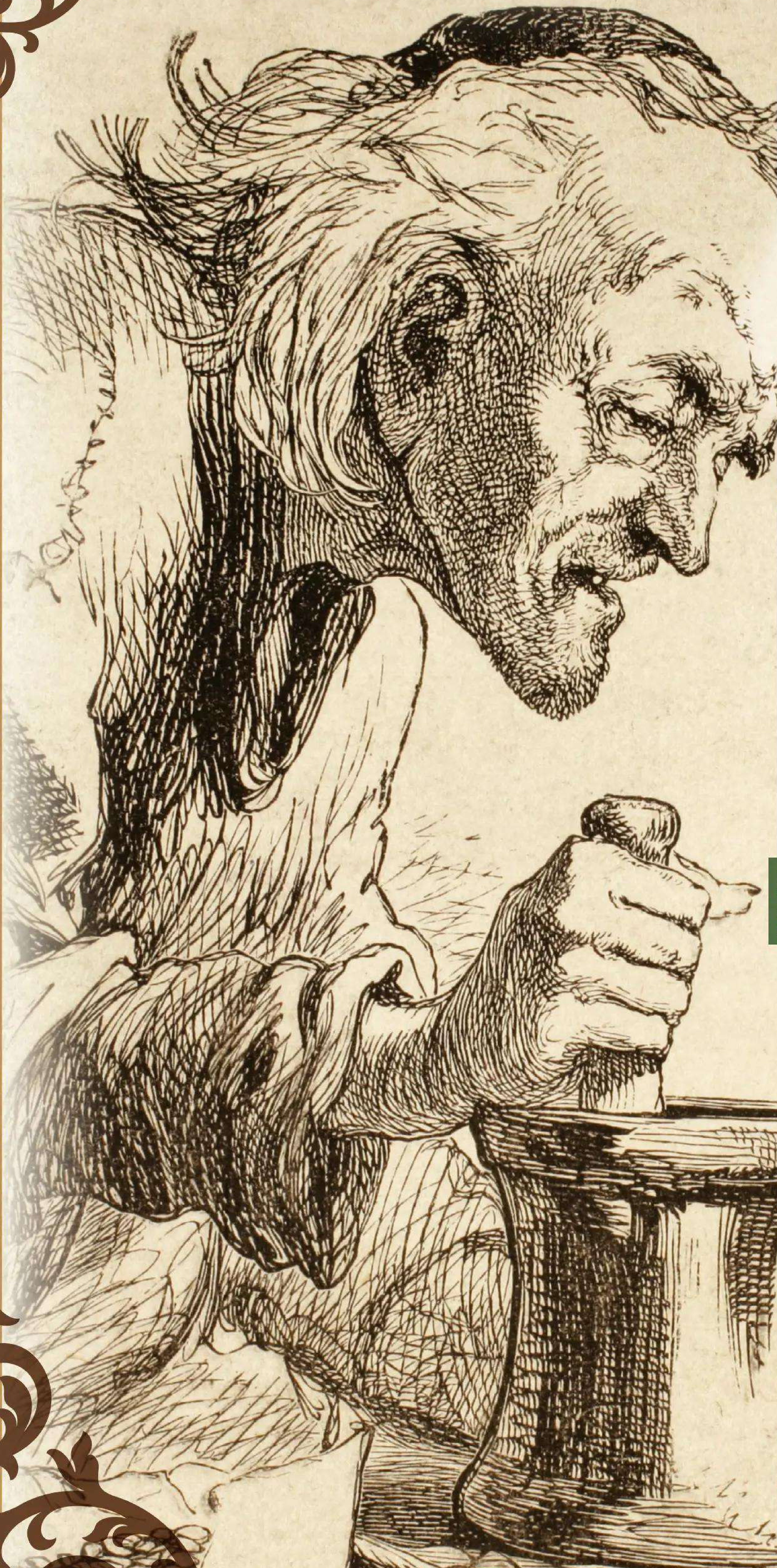
Often wound fever came about as a complication of gangrene, which itself was caused by bacteria multiplying in the site of a battlefield injury. Once gangrene or subsequent wound fever had taken hold of the medieval patient, the options for care were limited. For some, it was all a matter of faith and they turned to members of the clergy, who prayed over the infected portion of the body or bathed it in holy water. When this did nothing to halt the rot, the only option was amputation. In many cases, amputation of the limb simply came too late to save the sufferer. Once the injury had progressed to sepsis, the patient stood little chance of survival. It was a gruesome fate, and a far cry from those dashing knights and winsome maidens.

If wound fever set in, all the medicine, prayers and holy water in the world could do little to halt its deadly progress

Located inside the bowels of Heidelberg Castle in southwest Germany, this example of a medieval pharmacy has been furnished according to historical records



The word 'apothecary' is derived from the ancient Greek word apothēkē, which literally means 'a place where things are stored'



Medieval medics worked with some truly gross substances, including snail slime, boiled puppy fat and pounded mummy (the Egyptian variety)

MEDIEVAL MIXOLOGY

If you were suffering from an ailment during the Middle Ages then a visit to the apothecary could offer some weird and wonderful 'treatments'

Words Bee Ginger

Well established across most of Europe during the medieval period, apothecaries were usually family-run businesses, and remarkably given the status of women at the time, wives often worked alongside their husbands. Together these spousal teams served the masses (physicians were eye-wateringly expensive and thereby reserved for the nobility and the wealthy).

Despite the modern view that apothecaries were peddlers of useless potions (the word 'quack' comes from the Dutch 'quacksalver', which referred to someone who boasted about their salves), they were in fact well-respected professionals.

Apothecaries based their work on the theory of the four humours (blood, phlegm, yellow bile and black bile), which is thought to have been formulated by the father of medicine, Hippocrates, and states that an imbalance of the humours is the cause of disease. The work of apothecaries in England was overseen by the Worshipful Company of Grocers, an organisation established in London in 1345 by members of the Guild of Pepperers (which dated back to 1180) that was responsible for ensuring that spices were of the purest quality.

But that isn't to say that the treatments on offer at the time were only derived from herbs and spices. Apothecaries were a creative bunch, and from fat to urine, saliva, earwax, toenail clippings and even faeces, they mixed all sorts of substances together in the quest to cure a wealth of ailments. While there are countless different revolting remedies from this period, some of the more bizarre included Oil of Swallows, Syrup of Serpents and a combination of olive oil and earthworms used to treat joint pain.

In 1617, long after the end of the Middle Ages, England's apothecaries were granted a royal charter after breaking away from the Company of Grocers that enabled them to found the Worshipful Society of Apothecaries, further cementing their place in society. However, they hadn't been the only ones working to heal people.

Alchemists are best known for their attempts to turn lead (and other base metals) into gold and create the elixir of life, two lofty goals they believed could be achieved with the help of the Philosopher's Stone. This object may in fact have been a powder or liquid, but whatever its nature it eluded the greatest alchemists of the medieval age. But the dream of making a panacea that could cure all diseases wasn't entirely fruitless.

As they strove for the impossible, alchemists improved apparatus such as phials, flasks, filters, ladles and pestles and mortars, equipment that helped the first chemists to establish themselves in the 17th century and hone their skills. Without alchemy, the vital scientific breakthroughs made by chemists in the 1600s and beyond would likely have taken an awful lot longer to achieve.

AN APOTHECARY

WESTERN EUROPE, 1100

An apothecary was a busy place in medieval times since it was where substances used in medicine were sold to direct to patients as well as supplied to physicians and surgeons. Apothecaries were, to a great extent, the predecessor to modern pharmacists, mixing the smallest of quantities of herbs and spices to create treatments while offering medical advice and carrying out a small range of services.

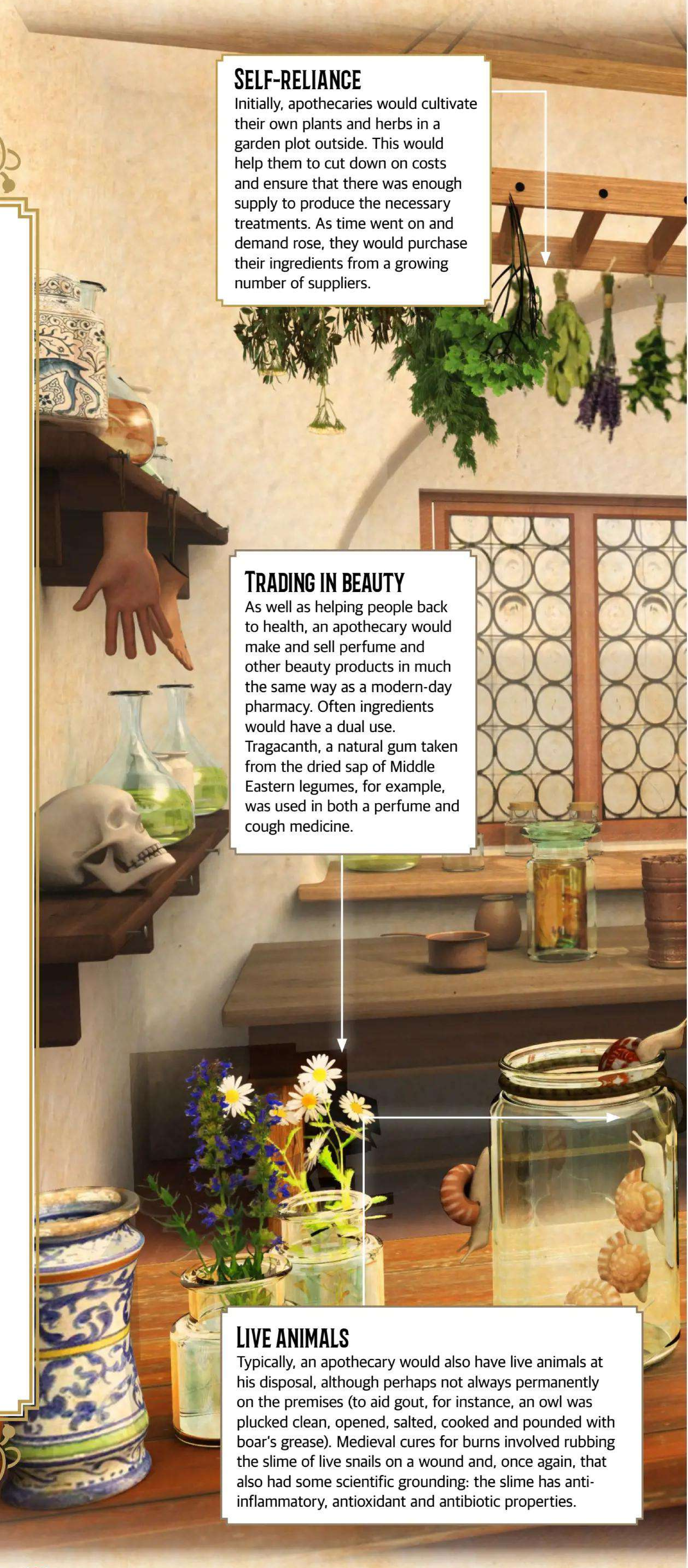
It could be imagined to be a place of wonder and hope with shelves packed full of jars and vials filled with powders and liquids. The air would be filled with the scent of exotic spices and some apothecaries would work hard to maintain a feeling of mystique.

They wanted people to feel both amazed and reassured that the sometimes off-beat ingredients (fat, flayed cats, hedgehog grease, bear fat and virgin wax were involved in treatments for throat infections) would do them great good and encourage a purchase.

The shops could be found across Europe, where streets were often named after them, especially when a handful existed side-by-side (Apothecary Street in London is one such case). For those who worked in them, there was much pressure, particularly as demands for cures grew and greater quantities of ingredients became necessary. Apothecaries could be blamed if a patient's condition did not improve – but they were seldom thanked if it did.

It didn't seem to matter that apothecaries did not have any formal training to begin with (examinations were introduced in the 15th century). Indeed, there were many cases where apothecaries would have dual roles, some perhaps doubling as a barber and even performing surgery.

It was not unusual for medicine to be done 'on the side', either, since the shops would sell perfumes, items for food, wines for general consumption and even stationary. Neither, come to that, was it rare for apothecaries to give advice or even diagnose illness even though the law stated their role was purely to supply medicine. Few found themselves prosecuted.



SELF-RELIANCE

Initially, apothecaries would cultivate their own plants and herbs in a garden plot outside. This would help them to cut down on costs and ensure that there was enough supply to produce the necessary treatments. As time went on and demand rose, they would purchase their ingredients from a growing number of suppliers.

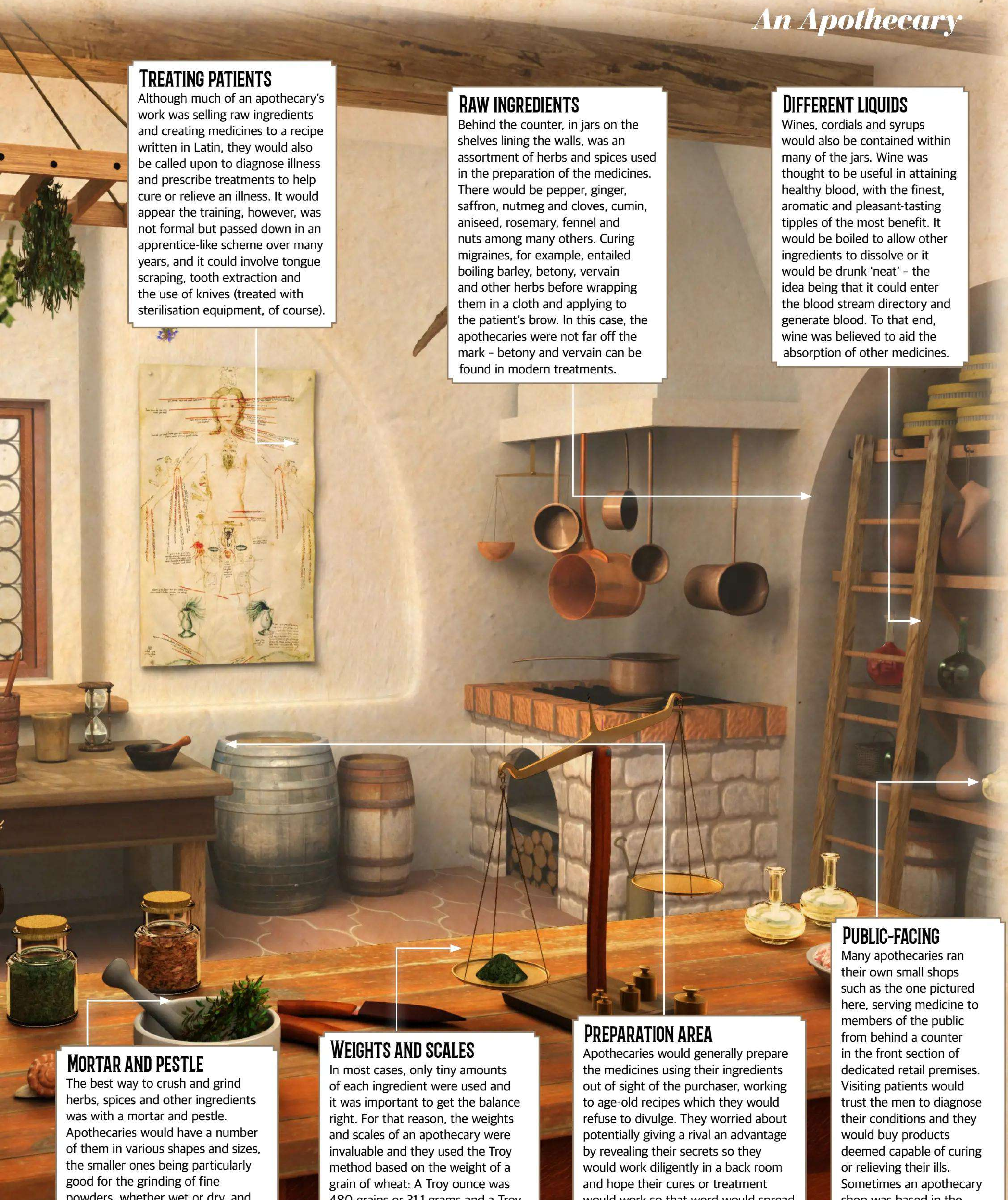
TRADING IN BEAUTY

As well as helping people back to health, an apothecary would make and sell perfume and other beauty products in much the same way as a modern-day pharmacy. Often ingredients would have a dual use. Tragacanth, a natural gum taken from the dried sap of Middle Eastern legumes, for example, was used in both a perfume and cough medicine.

LIVE ANIMALS

Typically, an apothecary would also have live animals at his disposal, although perhaps not always permanently on the premises (to aid gout, for instance, an owl was plucked clean, opened, salted, cooked and pounded with boar's grease). Medieval cures for burns involved rubbing the slime of live snails on a wound and, once again, that also had some scientific grounding: the slime has anti-inflammatory, antioxidant and antibiotic properties.

An Apothecary



TREATING PATIENTS

Although much of an apothecary's work was selling raw ingredients and creating medicines to a recipe written in Latin, they would also be called upon to diagnose illness and prescribe treatments to help cure or relieve an illness. It would appear the training, however, was not formal but passed down in an apprentice-like scheme over many years, and it could involve tongue scraping, tooth extraction and the use of knives (treated with sterilisation equipment, of course).

RAW INGREDIENTS

Behind the counter, in jars on the shelves lining the walls, was an assortment of herbs and spices used in the preparation of the medicines. There would be pepper, ginger, saffron, nutmeg and cloves, cumin, aniseed, rosemary, fennel and nuts among many others. Curing migraines, for example, entailed boiling barley, betony, vervain and other herbs before wrapping them in a cloth and applying to the patient's brow. In this case, the apothecaries were not far off the mark – betony and vervain can be found in modern treatments.

DIFFERENT LIQUIDS

Wines, cordials and syrups would also be contained within many of the jars. Wine was thought to be useful in attaining healthy blood, with the finest, aromatic and pleasant-tasting tipples of the most benefit. It would be boiled to allow other ingredients to dissolve or it would be drunk 'neat' – the idea being that it could enter the blood stream directory and generate blood. To that end, wine was believed to aid the absorption of other medicines.

MORTAR AND PESTLE

The best way to crush and grind herbs, spices and other ingredients was with a mortar and pestle. Apothecaries would have a number of them in various shapes and sizes, the smaller ones being particularly good for the grinding of fine powders, whether wet or dry, and larger ones for bulkier ingredients.

WEIGHTS AND SCALES

In most cases, only tiny amounts of each ingredient were used and it was important to get the balance right. For that reason, the weights and scales of an apothecary were invaluable and they used the Troy method based on the weight of a grain of wheat: A Troy ounce was 480 grains or 31.1 grams and a Troy pound 5,760 grains.

PREPARATION AREA

Apothecaries would generally prepare the medicines using their ingredients out of sight of the purchaser, working to age-old recipes which they would refuse to divulge. They worried about potentially giving a rival an advantage by revealing their secrets so they would work diligently in a back room and hope their cures or treatment would work so that word would spread about their personal effectiveness.

PUBLIC-FACING

Many apothecaries ran their own small shops such as the one pictured here, serving medicine to members of the public from behind a counter in the front section of dedicated retail premises. Visiting patients would trust the men to diagnose their conditions and they would buy products deemed capable of curing or relieving their ills. Sometimes an apothecary shop was based in the apothecary's home.

© Adrian Mann

Papaver somniferum, more commonly known as poppy, was regularly used in Arabic medicine after physician Yuhanna ibn Masawaih began prescribing it

> “POPPY WAS RESTRICTED AND USERS TENDED TO OVERDOSE”

ALCHEMY & ELIXIRS

Forget the legendary elixir of life – Arabic alchemists had been using practical elixirs as remedies for centuries

Words Poppy-Jay Palmer

Though alchemy has many different uses, it often goes hand-in-hand with medicine, especially in the case of Arabic alchemy. As practical knowledge of metal, stone and glass working advanced, so did peoples' knowledge of the science of pharmacology.

During medieval times, the term 'al-kīmiyā' was used instead of the modern 'alchemy' in alchemical books and had a rather literal meaning; it was used to describe the substance through which base metals could be transmuted into noble ones. However, al-kimiya was also often used as a synonym for 'al-iksir', now 'elixir'. Though the meaning has changed as the study has transformed, in ancient times al-iksir was frequently used with a far more general meaning, being a "medium for obtaining something".

Medieval Islamic physicians regularly used natural substances as remedies. Plants were a popular source, and hemp and poppy were both increasingly useful when it came to elixirs. Previously unknown to pre-Islamic Arabia, hemp was introduced in the 9th century from India through Persia and Greek culture when botanist Dioscorides, who was revered by the Arabs, suggested that hemp could treat pain such as earaches. Before it was properly introduced to Islamic medicine, poppy was restricted to the therapeutic realm and users tended to overdose. However, it became a medicinal staple when Persian physician Yuhanna ibn Masawaih began prescribing it to relieve pain from gallbladder stones and eye-, head- and toothaches, for indigestion and inflammation of the lungs.

Natural remedies made using alchemical procedures aren't just a product of ancient times. Inspired by medieval elixirs, many are still used today, created through procedures like fermentation, distillation and the extraction of mineral components from the ash of a plant. The result of these processes is known as spagyric, and the concept of spagyric remedy relies on three cardinal principles of alchemy: sulphur (the virtue of the plant, representing the volatile oil essence), salt (vegetable salts extracted from the calcined ashes of the plant) and mercury (the alcohol extract and life essence).

Though many elixirs are used by real people for practical purposes, others are merely legendary. The term 'elixir' is now often associated with the elixir of life, a potion that supposedly grants the drinker eternal life or youth and cures all known diseases. With the concept originating in Asia, specifically in either ancient India or China, alchemists from all kinds of cultures have sought out the means of creating it.

Elixirs have been used in alchemy for thousands of years, and the processes involved in creating them are still used for medical purposes

MEDICINE FOR THE MASSES

Many people in the medieval period relied on folk medicine – traditional treatments and cures passed down the generations

Words Ben Gazur

Many cures were provided by locals who had learned how to use natural products to create a range of medicines

Depending on who and where you were the medieval period offered a bewildering array of medical options. If you were wealthy and living in one of the great cities of Europe then your illness could be tended to by professional doctors who had attended several years of training at a university. For most people such doctors were either far away or far outside their budgets. When illness or accident struck they would turn to a trusted local healer or family member who offered help in the form of folk medicine.

HEALERS

Medieval villages and small towns could probably not support a full-time doctor. For certain ailments an itinerant healer would occasionally come calling. Those who suffered from cataracts would simply wait for a travelling man to visit who was skilled in slicing open the eye and either breaking up the cataract or sucking it out. For the more mundane and daily illnesses a medieval person relied on those with healing knowledge closer to home.

It is sometimes hard to uncover what medicine for the masses was like in the medieval period as most people were not literate and did not leave behind written accounts of their lives. Some of our best sources come from the annals of monasteries who offered what medical help they could to those who needed it. Local priests, who were supposed to know a smattering of Latin, might have read some medical texts and know how to help. Religious figures were able to call on divine aid as well as practical knowledge and so might have been the most trustworthy healers to the medieval peasant. St Hildegard of Bingen, who lived in the 12th century, has left a record of the sort of training a local healer might have had. Her medical texts draw on antiquity, oral history, folk wisdom and her own extensive experience to suggest cures.

Simple medical procedures such as setting broken bones would be jobs performed by anyone thought to be particularly good at it

As well as religious healers there were those villagers who were skilled in treating illnesses. There might be a local person renowned for their ability to set bones. Another could be trusted to find the right plant and create a potion. Others might be credited with secret knowledge and powers that allowed them to magically treat injury and illness.

Much of the healing available to medieval peasants came from these 'wise men', or more often 'wise women'. Wise women existed before the professionalisation of medicine and, because women were not let into medical schools, they continued to act as local healers for centuries.

The wise woman of a village could deliver a baby, concoct a poultice, and perform rituals. The cures they employed might have been passed down for generations and they would pass on their knowledge to their children or other relatives.

Towards the end of the medieval period, wise women and other cunning folk were sometimes charged with witchcraft for their cures. One woman who was put on trial had only reluctantly made a potion for a neighbour because "as soon as old people teach some treatment for the sick they are said to be witches".

FOLK REMEDIES

There was a strong belief in the ability of plants to cure many diseases. A medieval saying sang the praises of sage by asking "How can a man die who has sage in his garden?" Most folk medicine of the time would have relied on plants, herbs and minerals which could be found in the local environment. A popular theory of the time was that God had placed curative plants on the Earth for all illnesses – you just needed to know which ones to use. A thorough knowledge of the plant species nearby would have been vital to healers, and many would have cultivated a herb garden so that they always had some close to hand. The home of a folk healer was marked with hanging bunches of herbs left to dry for use in when the plants were out of season.

Herbalism, treating sickness with plants, flourished for centuries in the Middle Ages and for the very good reason that many plants are able to offer relief thanks to their chemistry. Ancient texts speak of chewing willow leaves and bark for their medicinal benefits and it was from these that aspirin was first isolated. Plants taken raw or as a tincture were known as simples and hundreds of

Monks and nuns often provided medical care to poor people using both academic learning and folk traditions

examples of medical simples are known from the medieval period.

The oldest English medical text is the 10th century text known as *Bald's Leechbook* which contains a multitude of cures involving plants. For headache a mix of beetroot and honey should be smeared on the face and the patient left in the sun. For nose bleeds you should poke an ear of barley into the ear. The plant agrimony could be boiled in milk to provide a cure for male impotence. While many of the cures suggested sound bizarre, when one of the recipes, made from leeks, garlic, wine, and bile, was tested on MRSA (a bacterium resistant to the antibiotic methicillin) in a laboratory in 2015 it proved as effective as the modern treatment.

Towards the end of the medieval period herbalists created a doctrine of signatures to help them ascertain which plants could help each disease. According to this theory, God had marked healing plants to make it easy to ascertain their uses. These signatures took the form of resemblances between the plant and the body part they helped cure. Walnuts, with their remarkable resemblance to brains, were thought to cure the head.

Animal ingredients were also used widely, such as pig lard being turned into various ointments. There was very little difference between the sort of things served on the dinner table and the ingredients of medicine. Folk medicine was created out of what was close to hand.

MAGICAL CURES

Medicines as we would recognise them were not the only medical cures on offer. Magic, superstition, and charms were all available in the medieval world. These were often used within a

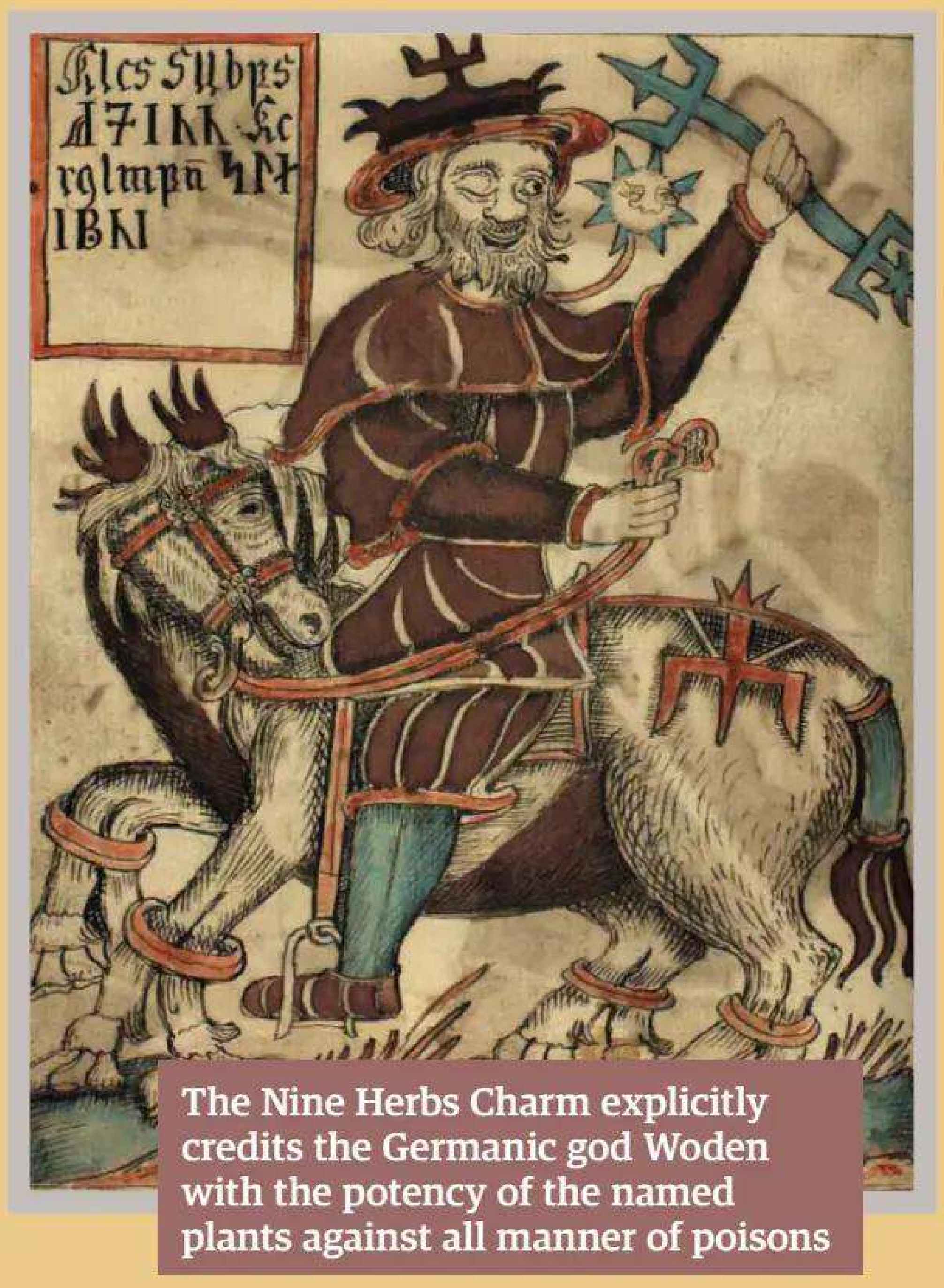
NINE HERBS CHARM

This healing charm combines pagan and Christian ideas

The *Lacnunga* manuscript contains many Anglo-Saxon remedies written down in the 10th century. One of the most famous is the Nine Herbs Charm, which describes the different powers of nine medicinal herbs and how the god Woden employed magical twigs against venomous snakes.

The charm reveals herbs which can be used against poison, so acts as an aide memoire for healers. It is also written mainly in poetry and was meant to be sung as a the herbs were mixed together. The poem addresses the named herbs directly as if the poet was speaking to them. "Be mindful, Mugwort… oldest of herbs… you are strong against poison." Other herbs are reminded of their strength in former days and told to stay strong as they are used to heal today. The charm is somewhat hard to translate due to both problems with the manuscript and its obscure language. One of the herbs named is Attorlaðe – a name which means 'poison-hater' – but the identity of this plant is disputed.

The charm credits the powers of the herbs to their creation by the god Woden, but also mentions Christ. The Nine Herbs Charm stands at the transition from pagan to Christian religion.



The Nine Herbs Charm explicitly credits the Germanic god Woden with the potency of the named plants against all manner of poisons

As medicine became a profession many doctors learned traditional cures and incorporated folk wisdom into their work, while others were banned from using them

Herbal simples used in folk medicine were made from plants which grew locally and could be harvested by anyone with the right knowledge

Christian framework. A charm with clearly pagan origins might also include a Latin Christian saying as an update to a traditional cure.

One early English text instructs readers on charms for various illnesses that mix Middle English words with Latin. One, a cure for fevers, requires certain words to be written on the host bread used in communion, which is then fed to the patient over three days. Some charms which have survived are simply invocations of the Christian God. A cure for the deadly diarrhoea called the bloody flux calls on the illness to stop by saying "May the blood stand still, like the Jordan stands still at the same time when Christ was baptised in it".

Charms which united folk medicine with religion were in some cases tolerated. Medieval pastoral manuals, guides for priests, said that reciting the Lord's prayer while gathering herbs could increase their potency as medicine. But spoken charms existed in England which made no reference to the Christian God and may have sprung from earlier traditions. One charm instructed pregnant women whose birth was delayed to go to a graveyard and step over a grave three times while saying:

"This will help me against the hateful late-birth,
This will help me against the ponderous heavy-birth,
This will help me against the hateful lame-birth."

Some charms involved the use of amulets which could be worn against the body to drive out sickness. These could be a simple as hanging a herb on a cord around the neck. Church authorities sought to differentiate between holy amulets and superstitious ones. St Thomas Aquinas declared that astrological talismans designed to call on the powers of the stars for healing were either useless or risked calling up demons. Trained doctors also wrote against the use of amulets that were widely used by the poor.

STAYING HEALTHY

Curing sickness for most medieval people did not involve a single medical intervention. Everything that could influence the health had to be considered. A patient might be encouraged to pray, wear an amulet, say a charm, and consume a potion. Each of these methods drew on a separate stream of knowledge. The people of the medieval era were practical people, they had to be, so if anything was thought to work they stuck with it. Some of their medical advice can even still be helpful today. A sick person should be made to rest, exercise moderately, eat good food, and be made cheerful.

THE GOLDEN AGE OF ISLAMIC MEDICINE

Islamic and Arabic medicine prospered in an era that built on learning from the ancient world and witnessed the first hospitals and pharmacies

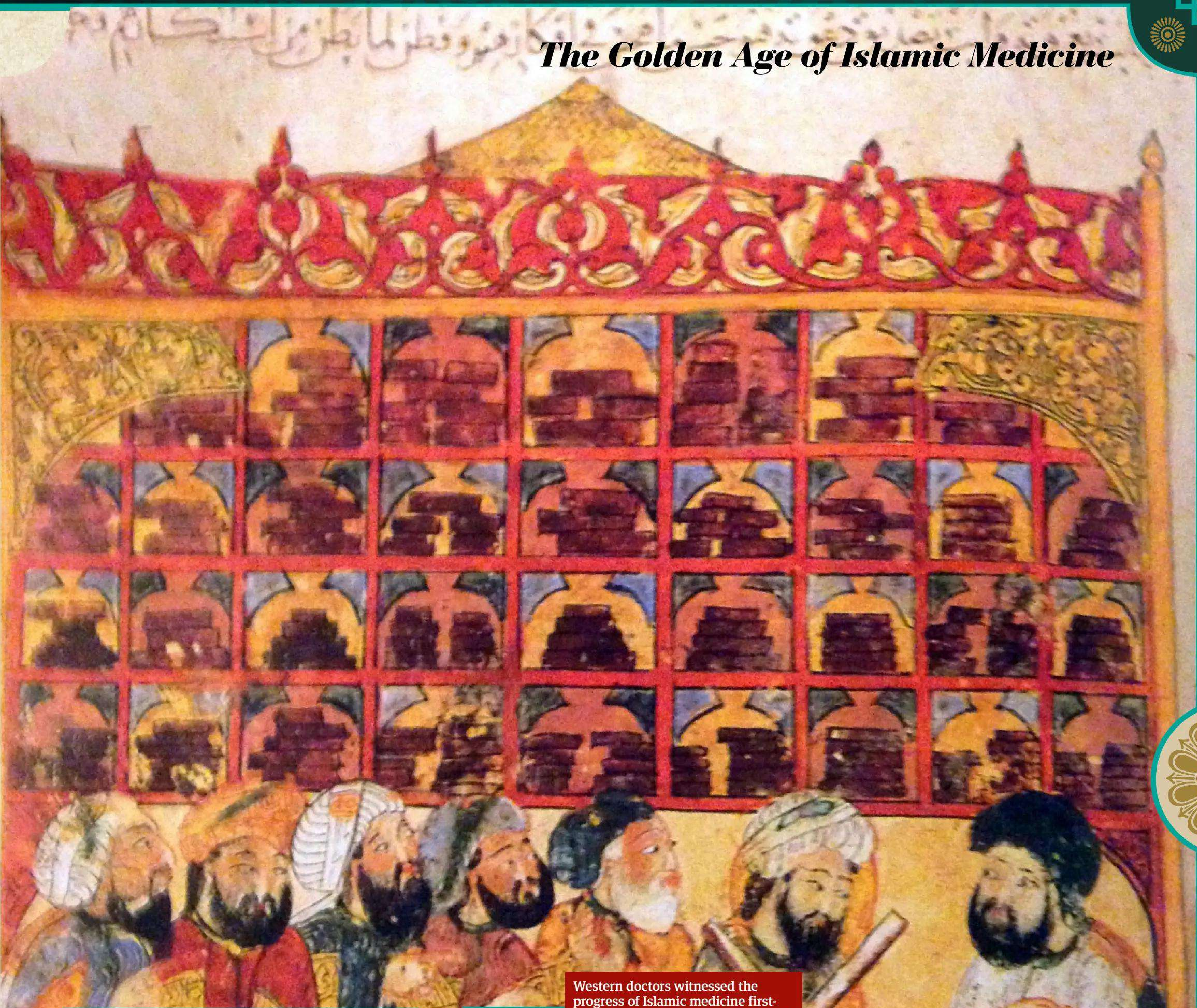
Words Jack Griffiths

The golden age of Islamic medicine was a time of great progress for medicine, surgery and healthcare. At its peak from the 9th to 13th centuries, it took inspiration from ancient Greek and Roman medicine and built upon it. The development of learning took place across the Abbasid Caliphate with borders that extended over North Africa, the Arabian Peninsula and modern-day Pakistan. The nucleus of learning in the caliphate was its capital, Baghdad. A young yet thriving city, scholars would travel there to visit learning centres. It became a hub of teaching and intellectual thought, especially in health and medicine.

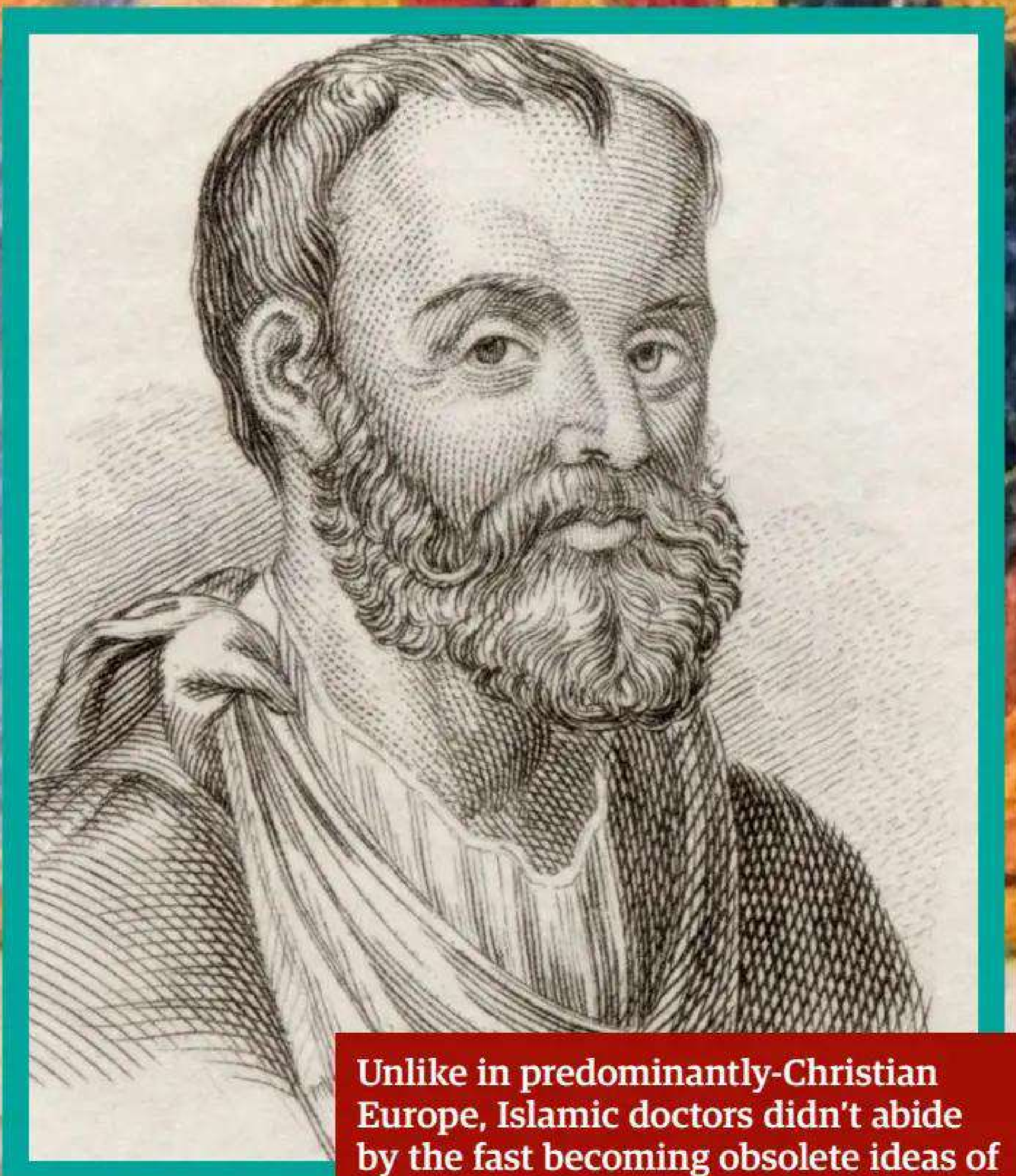
Across the medieval Islamic world, many hospitals were constructed and today's general hospitals were influenced by the ones opened during this era. These health centres were called bimaristans, which comes from the Persian 'bimar' for 'ill person' and 'stan' for 'place'. The first bimaristan opened in Baghdad in 805CE; its place in the city was chosen to be where it took the longest time for meat to rot, with the belief that the air was cleanest there. Bimaristans were an upgrade on the monasteries that were used to treat the sick and wounded in the Western world. Funded by the state, they welcomed people from all backgrounds and even had admission records and case studies on different patients. They had different wards for different illnesses and were staffed by doctors who were Muslim, Jewish and Christian.

The Qur'an placed significant importance on hygiene, leading to an increase in focus on health and medicine. This era also signalled the birth of pharmacies as doctors prescribed herbal remedies, administered in modern vessels like beakers and flasks. Opium was used to treat pain and disease, honey was a commonly prescribed drug and colchicine was recommended for gout. The latter is still used today to treat some conditions that cause inflammation.

Physicians published books with drug formulas and different types of medicinal plants in, including known toxic ones. Senior figures happily passed on their knowledge to students, ensuring progress continued across generations. Medical encyclopaedias were written, or translated from Greek and Hebrew to Arabic, to record all these advancements. This learning was later transported to Europe, where medical expertise would go on to flourish, thanks to Latin translations of Arabic books. In the Islamic world however, wars and invasions, especially that of the Mongols in 1258, would signal the end of the golden age.

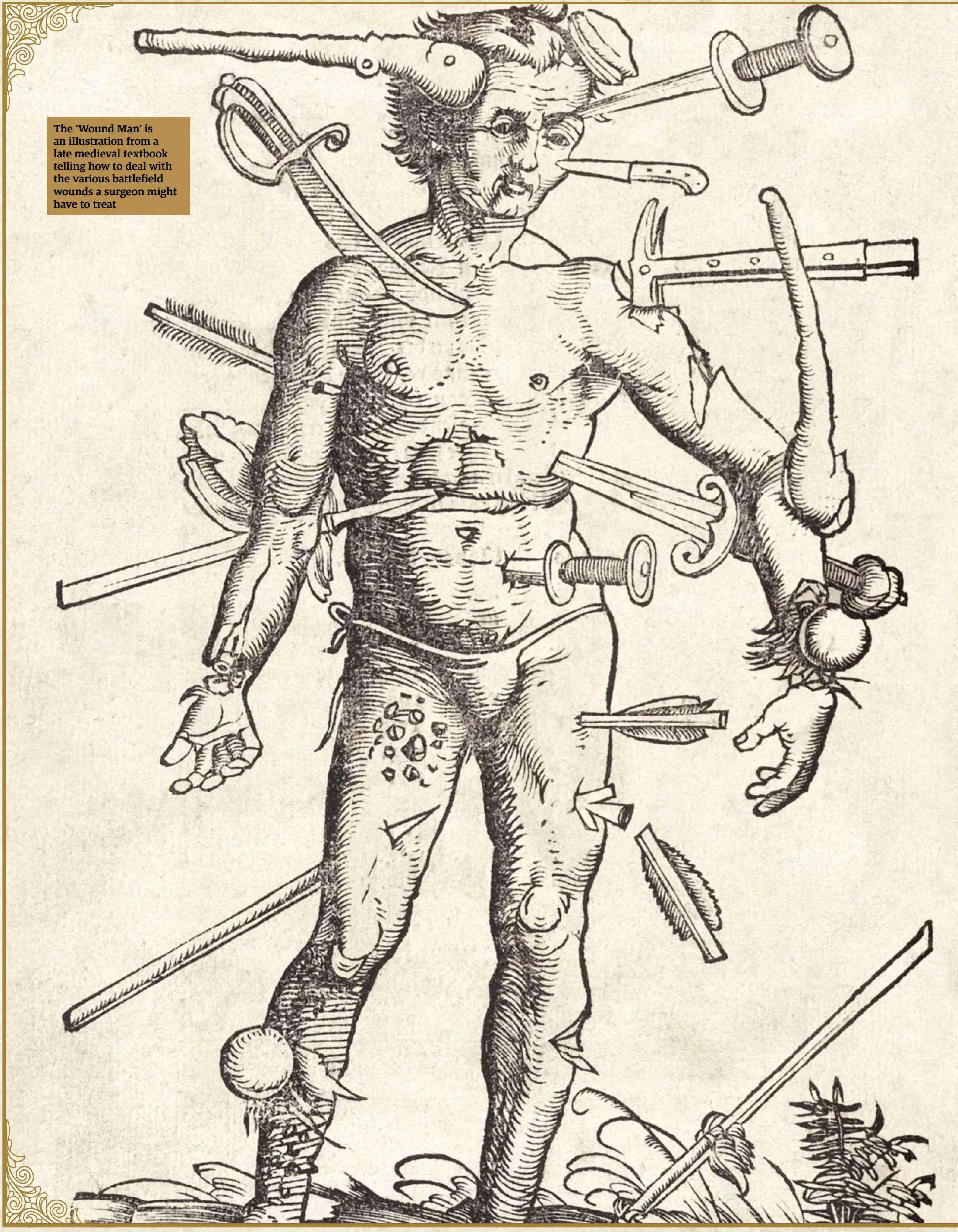


Much of the golden age coincided with the rule of the Abbasid Caliphate. Its capital, Baghdad, contained schools, libraries, hospitals and pharmacies



Unlike in predominantly-Christian Europe, Islamic doctors didn't abide by the fast becoming obsolete ideas of the ancient Roman physician, Galen

Western doctors witnessed the progress of Islamic medicine first-hand during the Crusades, a series of holy wars where European powers attempted to retake the Holy Land



The 'Wound Man' is an illustration from a late medieval textbook telling how to deal with the various battlefield wounds a surgeon might have to treat

THE FIRST MEDICAL SCHOOLS

Nowadays, training to be a doctor takes years at medical school. But how did medieval medics learn their skills?

Words Edoardo Albert

Suppose you were alive in 1350 and you fell ill, what would you do? Who would you go to for help? The answer depends on where you lived, how rich you were, and what was wrong with you.

By the high Middle Ages, there were three main types of official medical practitioners, plus various unofficial healers who were not necessarily any worse than their official counterparts. On the side of the recognised medical practitioners, there were physicians, surgeons and apothecaries. On the unofficial side, there were local herbsmen and women who practised folk remedies passed down the generations, as well as midwives.

The medical ideal was that you would see a physician, who would diagnose your illness, and then refer you to the surgeon if it required surgery or to the apothecary if it required medicine. In practice, there was a great deal of toing and froing between the different practitioners, in particular because consulting a physician was usually the most expensive form of treatment. This was because physicians had been trained in one or other of Europe's new universities, taking years of study before being licensed to practise as a physician. As such, properly certified physicians were more prestigious than surgeons or apothecaries, but their practice was also burdened with the need to recoup the high cost of their training from their patients' fees.

What in reality happened was that you consulted the medical practitioner who was closest and who you could afford. For most of the rural population that would either be a local herbsman or, more often, woman, dispensing folk remedies of perhaps little effect but also of little harm, or a monk in a nearby monastery. Before the establishment of universities, monasteries were the main centres of learning and the monk charged with looking after his brethren's health would also treat the local people as part of the monastery's ministry.

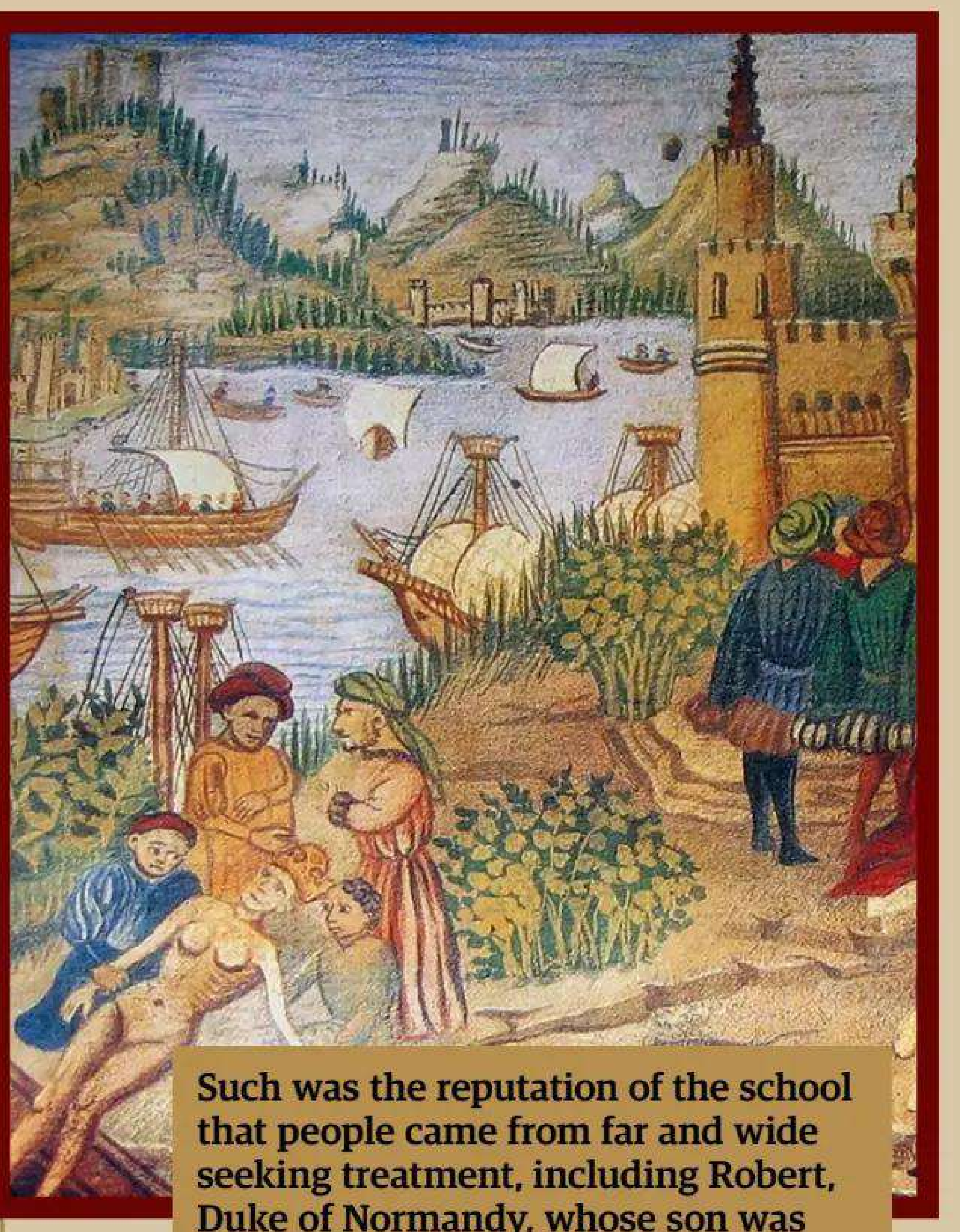
WOMEN DOCTORS

Though fewer in number than men, female medics did exist

In medieval times, physicians were all men. But there was one exception: the oldest medical school in Europe, the Schola Medica Salernitana in Salerno, which lies on the west coast of Italy south of Naples, both admitted women as students and had women on the faculty. Among these professors was a woman known as Trota who taught at the school in the early 12th century.

Trota was particularly known for her work on what we would now call obstetrics and gynaecology, although she also wrote on a range of diseases that affected both sexes. Among her treatments, Trota devised a concoction to be given to women suffering from excessive bleeding during their periods. The medicine included among its ingredients such reasonably everyday items as plantain and pomegranate but also the far more exotic burnt elephant bones and dragon's blood. Dragon's blood is actually the sap of the Dracaena draco tree. When the tree is damaged, it bleeds red sap which solidifies, producing a dark-red resin which was marketed as dragon's blood.

We know there were also women students at the school because an early document mentions that "Ut ferrum magnes, juvenes sic attrahit Agnes" ("Agnes attracts the boys like a magnet attracts iron"). It's good to know that, despite many other changes, in some ways medical students have not changed over the centuries.



Such was the reputation of the school that people came from far and wide seeking treatment, including Robert, Duke of Normandy, whose son was William the Conqueror

Medieval apothecaries dispensed a wide range of medicines with ingredients including dragon's blood, crushed elephant bone and hemlock. The patients usually survived

Letting blood was one of the key medical treatments of the time. It was less effective than most but not dangerous in moderation

> “STUDENTS OF MEDICINE BEGAN THEIR EDUCATION BY STUDYING GRAMMAR, RHETORIC, LOGIC, ARITHMETIC, GEOMETRY, ASTRONOMY AND MUSIC”

However, in the towns and cities there were university trained physicians available, as well as surgeons, who doubled their income by working as barbers too, hence the red-and-white traditional barber's pole, and apothecaries. Apothecaries were the cheapest and the most widespread dispensers of medical help, with every town and even some of the larger villages having at least one. Apothecaries were closely linked with grocers, as the products they used were usually natural plant products. To become an apothecary meant becoming apprenticed to a practising apothecary and learning the skill by copying and doing. Given the ingredients used in some medicines, careful preparation and measuring was vital. For instance, 'dwale', which was used as an anaesthetic during operations, contained as well as the gall of a boar, hemlock, henbane and opium, all of which are potentially lethal.

It was the same for surgeons. Prospective surgeons were apprenticed to practising surgeons, learning the skill from seeing and, hopefully later, doing. The association between surgeons and barbers came from there being a similar range of skills and equipment required to give a shave and to bleed a patient or lance a boil. Since warfare was endemic but generally low level, surgeons also had frequent opportunities to practise their skills on wounded knights and men-at-arms, leading to surprisingly effective treatments. For instance, Prince Henry, who would become Henry V, was shot in the face by an arrow at the Battle of Shrewsbury in 1403. Although the shaft was removed, the arrowhead became embedded in his cheek. The surgeon, John Bradmore, used special tongs to remove the arrowhead and then washed the wound with wine and cleaned it with a honey-based ointment. The wound healed cleanly and Prince Henry survived, although it must have been a hideously painful procedure, involving widening the wound so that Bradmore could insert the tongs. Honey would have been particularly effective as it acts as an antibiotic as well as drawing fluid, and thus infectious bacteria, out of the wound.

Medieval physicians had to study long and hard to qualify. Spectacles were invented in the late 13th century, enabling long sighted students to read the texts they had to learn

This was all very well for the practical skills of the surgeon and the apothecary. But to become a physician it was necessary to study. The first institution that we could recognise as a medical school was established in Italy, in Salerno, in the 9th century. The Schola Medica Salernitana became known throughout Europe for its teaching, with students travelling there from all over the continent to enrol on its teaching programme. This required eight years of study: three years of training in logic and then five years of medical training, followed by a practical year under the direction of an experienced physician. As well as dissecting pigs, which were thought to be closest to humans in their internal structure, the school benefited from a lessening in the old classical prohibition against human dissections. The professors there performed a human dissection every five years. While this was inadequate, it prepared the way for the new universities that began to be established in Europe from the 11th century onwards.

The Schola Medica Salernitana never broadened its curriculum to include the range of subjects that were taught at the medieval universities, so it is not counted as the first of them, although it predates the University of Bologna by at least 150 years.

The University of Bologna was founded in 1088, although it only became a fully-fledged university a century later, followed in the 13th century by the universities of Oxford, Paris and Cambridge. Along with teaching canon law, theology and philosophy, these early universities also taught medicine, producing qualified physicians who, by virtue of their years of study, quickly became the top of the medieval medical tree.

The University of Bologna was an early example of pupil power: the students there banded together to run the university, voting through their representatives on who to hire as teachers, how much to pay the professors and the content of the courses. There was even a committee, called the 'Denouncers of Professors', to which students could report teachers who did not keep time or who failed to teach all their classes during a term.

Students of medicine at Bologna, and indeed at all the other medieval universities, began their education by studying the seven liberal arts: grammar, rhetoric, logic, arithmetic, geometry, astronomy and music. Only after completing these studies, which could take three or four years, could they move on to the study of medicine.

At Bologna, the study of medicine lasted for four years. During that time, the student physician attended 46 lectures, each lecture based upon a text by one or other of the classical authorities, in particular Hippocrates and Galen, plus lectures on the work of the Persian polymath, Avicenna (Ibn Sina), whose *Canon of Medicine*, written in 1025, was the single most influential medical textbook of the time. The students' study was, at least in its initial stages, highly theoretical, revolving around careful logical analysis of the chosen texts, with relatively little practical work. However, the practice of careful description and analysis led to physicians writing detailed descriptions of the course of diseases, laying the foundations for medicine to move gradually towards an evidence-based appraisal of treatments. Although it did little to stop the spread of the disease, physicians around Europe wrote accurate descriptions of the symptoms of the bubonic plague, allowing us now to accurately measure its spread and identify the causes of the disease.

An example of the advances produced by these medical schools comes from the English physician, Gilbertus Anglicus ('Gilbert the Englishman' c1180 – c1250). Although an Englishman, Gilbert taught at the medical school of the University of Montpellier in France. As an example of how people travelled to learn, Gilbert had trained in medicine at the school in Salerno before returning to England to practise as a physician. However, Gilbert left England in 1205, travelling throughout Europe and becoming widely known as one of the foremost physicians of the era. Settling in Montpellier, he wrote his encyclopaedia of medicine (*Compendium Medicinae*) while teaching at the medical school. In fact, the medical school at Montpellier is the oldest continuously operating medical school in the world. In his *Compendium*, Gilbert argued that diseases such as smallpox and leprosy were infectious, beginning the long search that would eventually lead to effective treatments for these and other infectious diseases.

As well as teaching medicine, these early medical schools put in place the professional standards that still govern how doctors treat their patients. That doctors should strive to heal their patients, respecting their confidences and treating the poor as well as the rich with no regard for relative wealth comes directly from the ethics inculcated by these first medical schools. We have a lot to thank them for.

HOSPITALS AND ALMSHOUSES

Medieval health care might seem an oxymoron but this was when many hospitals were first founded

Words Edoardo Albert

The oldest hospital still caring for patients on its original site is St Bartholomew's in Smithfield in London. It was founded in 1123 by a man called Rahere, who had fallen ill while he was on a pilgrimage to Rome. Rahere vowed to found a hospital if he lived and, when he recovered and returned to England, that was exactly what he did.

But while St Bartholomew's is the oldest surviving hospital, it was by no means the first. In fact, hospitals go back to the early centuries of Christianity. A religion that believed that the poor were more welcome in the kingdom of heaven than the rich and whose founder had spent a great deal of his ministry healing the sick had to pay far more attention to these people than the ancient world had ever done. The first hospitals, which provided shelter and accommodation to travellers, were established in the fourth century. These quickly expanded their services to care for the sick as well as travellers and by the fifth century there was already a wide network of hospitals in the Byzantine Empire which endured until Constantinople fell in 1453.

In the West, the chaos of the fall of the Empire hindered the establishment of similar institutions but the Church nevertheless mandated its own servants to do what they could: the Council of Chalcedon in 451 required monasteries to provide shelter to travellers while a papal decree ordered bishops to reserve a portion of diocesan funds to support the local poor.

By the 7th century, hospitals had been established throughout much of western Europe, their remit covering hospitality for travellers and pilgrims, relief for the poor, and care for the sick and dying. As a mark of humility, the staff at these institutions would often wash the feet of their patients when they first arrived at the hospital.

There was a further huge increase in hospital provision in the 12th and 13th centuries, associated with the general renewal of the Church. Some of the new religious orders specialised in caring for the sick, among them, surprisingly, the Knights Hospitaller who started with a hospital in Jerusalem and only later took up arms to protect pilgrims to the Holy Land. Contrary to the usual modern image of bigoted medieval Christians, the Knights provided health care to Muslims and Christians alike at their hospitals.

In England there were over 700 hospitals by the time of the Reformation. Henry VIII's closure of the monasteries left many of the poor and sick that they cared for abandoned, and it took another 200 years for health care provision in England to return to medieval levels.

The facilities in the first hospitals were basic, with patients sleeping on mats on the floor, but beds were soon provided with clean sheets

A village hospital might have a handful of beds but hospitals in cities could have hundreds of patients, although sometimes the sick had to share their beds

LEECHES AND BLOODLETTING

In the medieval era, bloodletting was a common medical practice. Sometimes, just to make sure it went smoothly, physicians even let leeches do the job

Words Catherine Curzon

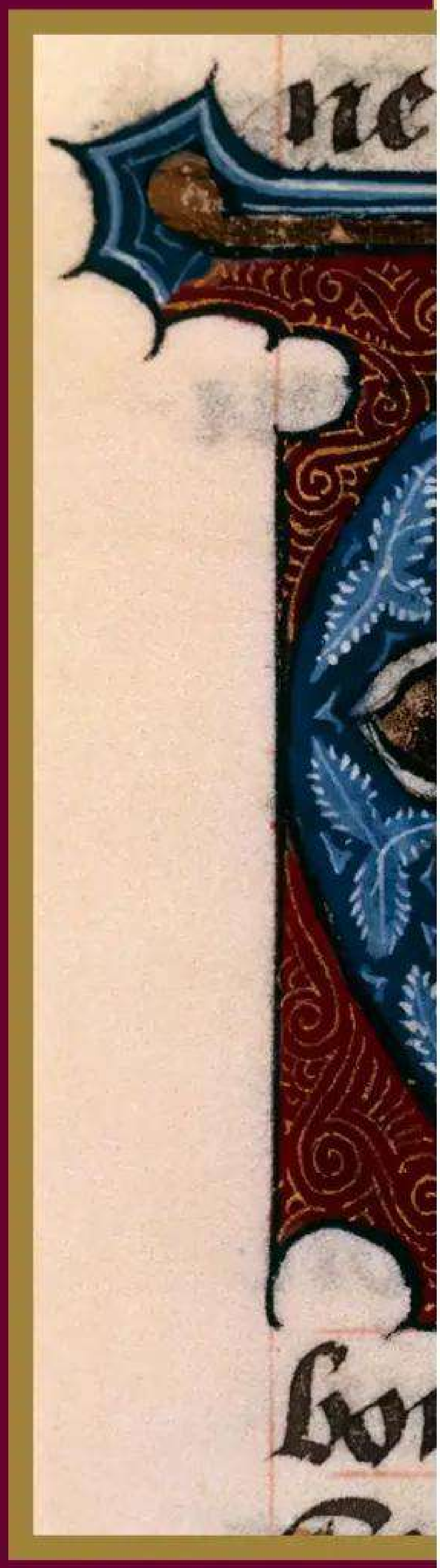
Since ancient times, physicians have believed that bleeding a patient – draining blood from their body under medical supervision – was the key to curing everything from smallpox to a broken heart, cancer to mental breakdown. It was a practice that physicians and barber-surgeons in the Middle Ages were wholeheartedly committed to, convinced that bloodletting was a reliable way to balance the four humours: blood, phlegm, yellow bile, and black bile, and restore a patient to full health.

In order to begin the process, practitioners would simply make a small cut in a vein in the patient's arm or neck and drain their blood into a bowl until they deemed that the unfortunate subject was in balance once more. Whilst some doctors used a small blade or other sharp implement, others preferred a special bladed tool known as a fleam to make the cut. Others, meanwhile, would simply sharpen a piece of wood and get to work. Don't forget that all of this took place in a time before the sterilisation of medical tools.

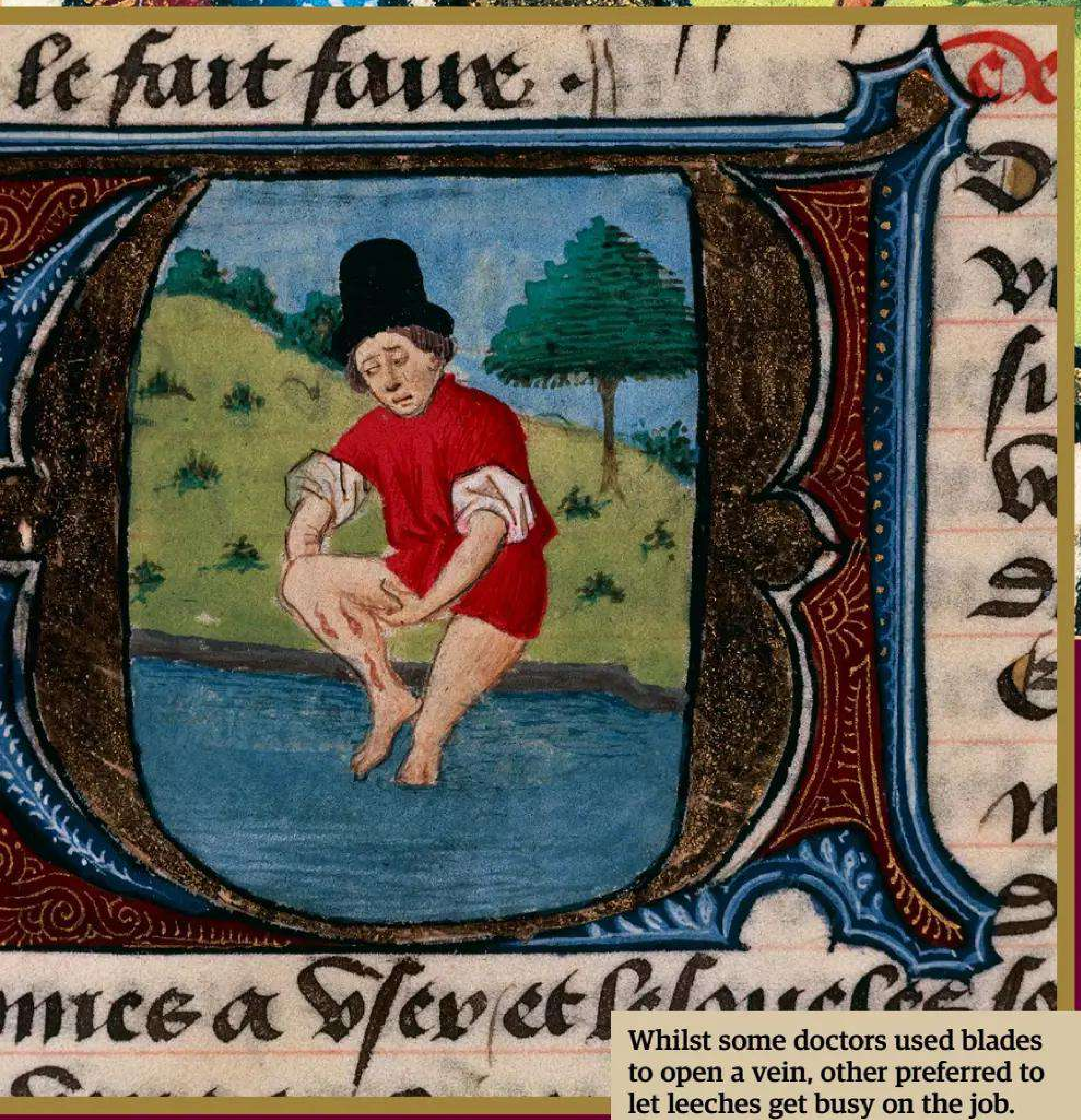
Where a blade wouldn't do the job, leeches were employed to draw blood instead. In this method, leeches were attached to various parts of a patients' body, sometimes in small numbers, sometimes by the dozen, and got to work. When the engorged leeches fell away, the subject was declared to be treated and their humours balanced once more.

As this procedure grew in popularity, experienced practitioners, sometimes nicknamed leeches themselves, produced so-called 'leech books', medical manuals intended to guide their contemporaries through the process of drawing blood. With ever more leeches required, leech collectors went to work. These people, often very poor, went out into the leeches' watery habitat and waited for them to attach themselves. Then they would wade back to shore and collect the leeches that were feeding on their blood, before selling them to doctors for use in bloodletting.

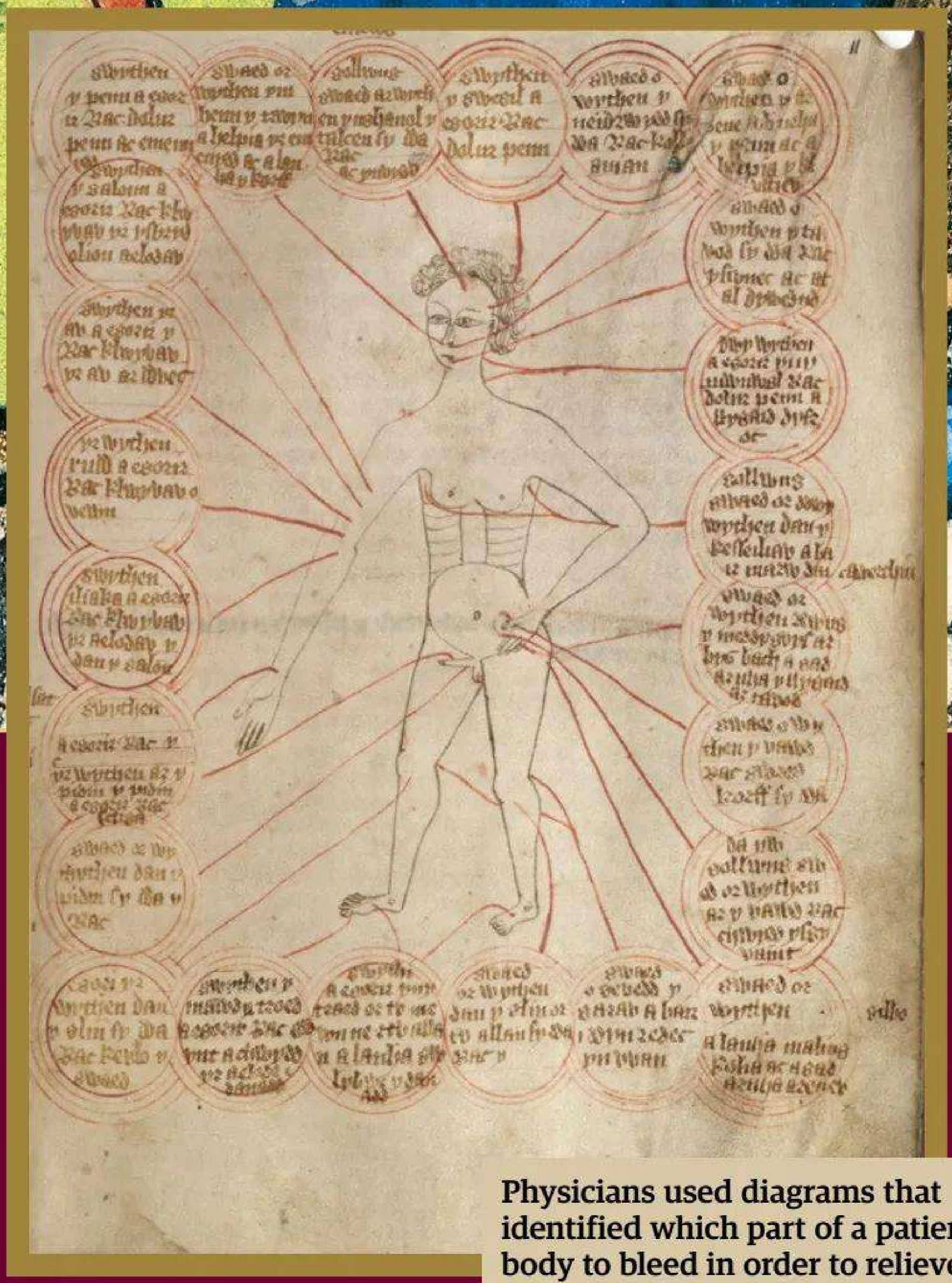
Bloodletting was widespread for centuries but in modern times it is no longer an everyday part of medical care. It may come as a surprise to discover that leeches, however, are making a comeback. Today these slippery little creatures, specially bred and sanitised before use, are still employed in some fields of medicine including plastic and reconstructive surgery. Their unique ability to encourage blood flow and increase circulation in hard to reach and delicate areas can save patients from potentially catastrophic complications. Best of all, no leech collectors are required to gather the harvest!



For medieval physicians, bloodletting was a key part of treating any number of disorders; after all, they had to keep the four humours in balance



Whilst some doctors used blades to open a vein, other preferred to let leeches get busy on the job. Today, they still do



Physicians used diagrams that identified which part of a patient's body to bleed in order to relieve their symptoms

Medieval barber-surgeons hoped to perfect their skills whilst performing procedures for soldiers both on and off the battlefield

Whether trimming a tonsure, pulling a tooth or removing a gangrenous limb, barber-surgeons were the go-to men for surgical care

THE BARBER SURGEON

In the Middle Ages, a barber-surgeon offered their clients hair-raising services that went beyond a short back and sides

Words Catherine Curzon

The barber-surgeon is perhaps one of the most familiar medical practitioners to emerge from the Middle Ages, their premises immediately identifiable by the red and white (and sometimes blue) barber pole, which symbolised the blood of their surgical procedures and the bandages with which that blood would be stemmed afterwards.

Barber-surgeons were a familiar sight in the medieval world and they performed a selection of vital services – usually asking for payment upfront in case their patient didn't survive to pay after. They initially emerged from the clerical world, where monasteries appointed their own barber-surgeons to take care of the tonsures (the distinctive shaved haircuts) of monks. Whilst monks often offered some medical care, when the church decreed that members of the clergy were not permitted to spill blood, this ruled them out of performing the popular medieval medical procedure of bloodletting. Instead, monks trained their barbers in this crucial skill, believing that their skill with scissors and blades made opening a vein the next logical step. Once only barbers, now they were barber-surgeons.

Medieval physicians preferred not to perform surgery, believing that it was little more than manual labour. This left the field clear for the barber-surgeons who had trained in monasteries, or followed soldiers into battle, to proliferate. They served both the working classes and nobility, with varying success, and whilst some made their fortunes and found themselves resident in the castles of their patrons, others pulled teeth and opened veins on a street corner for patients in the most dire need.

Barber-surgeons were the go-to for patients who needed bloodletting to balance their humours or someone to pull a tooth; they were an essential figure in everyday life. Many were affordable, though not always skilled, and as the years passed some towns introduced licensing schemes which provided patients with some scant hope that they were visiting a man who knew what he was doing. Sadly, that was not always the case.

In order to find a barber-surgeon, those in need looked out for a length of bloodied bandages hanging from a shop sign, which indicated the presence of a surgeon who had washed and was drying their used bandages. Though barbers were prohibited from performing surgery in the 16th century, today their red and white painted poles remain as a reminder of those bloodied bandages, drifting in the wind.

The instantly recognisable striped barber shop pole owes its appearance to the bloodied bandages once displayed by the barber-surgeons

MEDIEVAL MEDICAL INSTRUMENTS

Healers in the medieval world had a large kit of implements they could use – even if they look like tools of torture today

Words Ben Gazur

Medieval healers had a wide range of tools they used on patients. Metal scalpels and knives were used to cut open ulcers, drain blood, and hack away cancerous tissues. Those struck down with bladder stones in the early medieval period would have relied on a surgeon cutting a hole in their perineum and inserting a hook to pull the stone out or crush it.

Most medieval people would have relied on barber-surgeons for everything from blood-letting to tooth extraction. Barbers had specialised implements for extracting blood called fleams – triangular metal blades that were placed over a vein and sharply tapped with a stick to create an incision. To pull teeth they used a tool called a pelican, which was essentially clawed pliers.

All surgeons have to deal with blood loss and so tools were made to stop the flow of blood too. One of the most extreme was the cautery iron. A metal tool was heated over a fire until it glowed a dull red, then applied to the wound. The heat would instantly stop the bleeding but would also destroy a great deal of tissue. The skull of the 11th century St Davinus in Pisa shows evidence of cauterisation with a tool that had a pentagonal head.

Cauterisation was used to treat ulcers, cancers, infections, and was often used in amputations. Excavated bodies show that very few people survived having any of their limbs cut off. Medieval texts by doctors say that amputation should only be used as a last resort. Surgeons used knives and saws to slice away the limb as quickly as possible.

At the Battle of Shrewsbury in 1403 Prince Henry was struck with an arrow that buried itself six inches into his face. When attempts were made to remove it the shaft broke, leaving the head lodged inside. John Bradmore was both a surgeon and metalworker and he created a special tool with tongs that could be inserted into the wound and grasp the arrow by the turning of a screw. The arrow was successfully removed, though the future King Henry V was scarred for life.

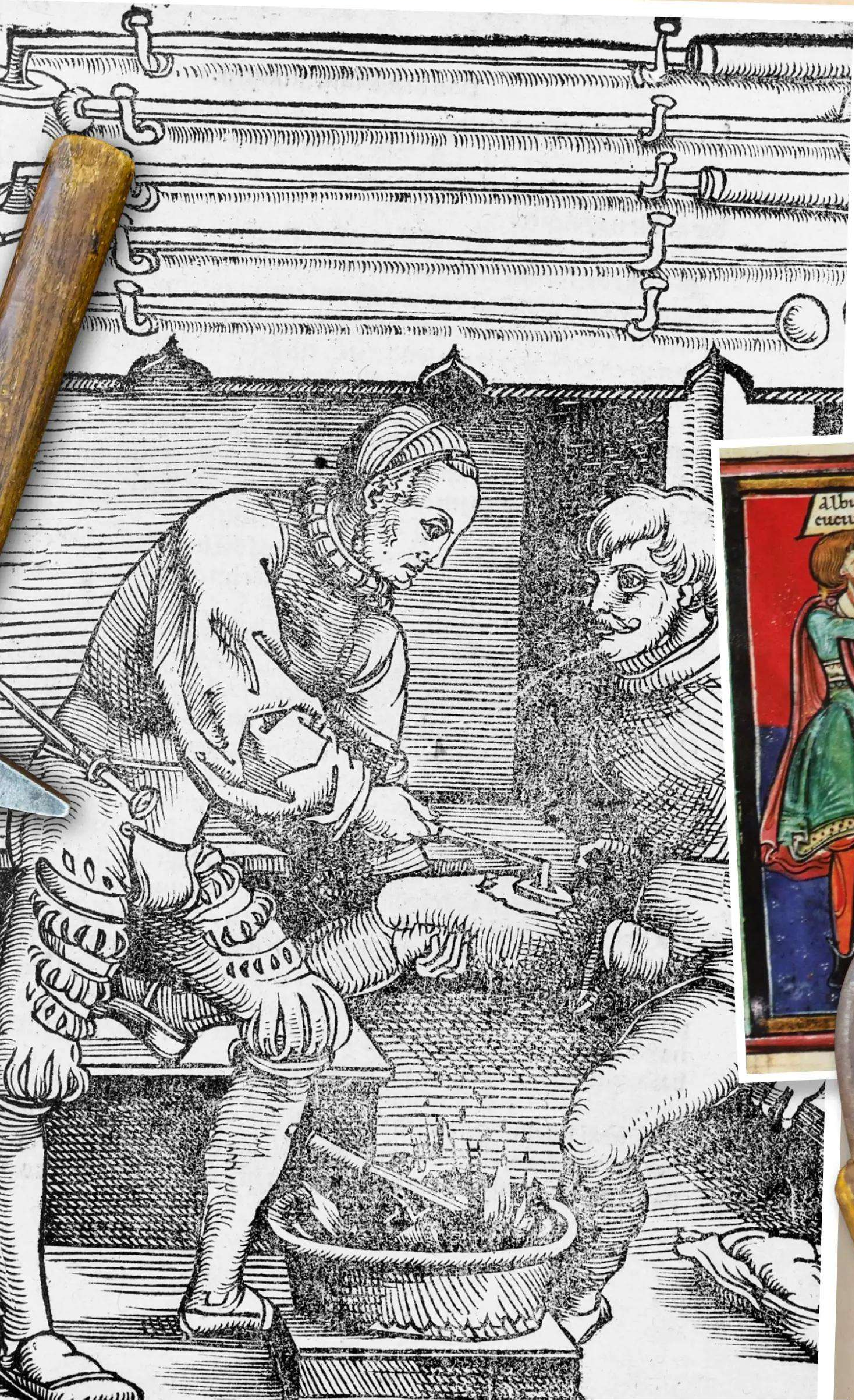
A humerus found in a medieval monastery in Varnhem, Sweden was discovered with a copper plate bent around the bone and then riveted together. The fracture in the bone showed signs of healing suggesting that the patient had survived this treatment for some time. The bone is stained green from the copper.

That all of these surgeries were performed without anaesthetic and without antibiotics to treat the resulting infections should not be forgotten. Being treated in the medieval world was an act of bravery.

Most medieval surgeries were not carried out by doctors but by barber-surgeons who could extract teeth or cut off limbs

albule oculorum sic excu cuciuntur

Specialised surgeries, such as eye operations, required specially made tools for the intricate tasks involved



Cauterisation, using hot irons, stopped bleeding after surgery or injury but was also used for a range of medical conditions

GIVING BIRTH THE MEDIEVAL WAY

In the medieval era, mothers-to-be were grateful for the guidance of their midwives; it was a rare example of women leading the way

Words Catherine Curzon

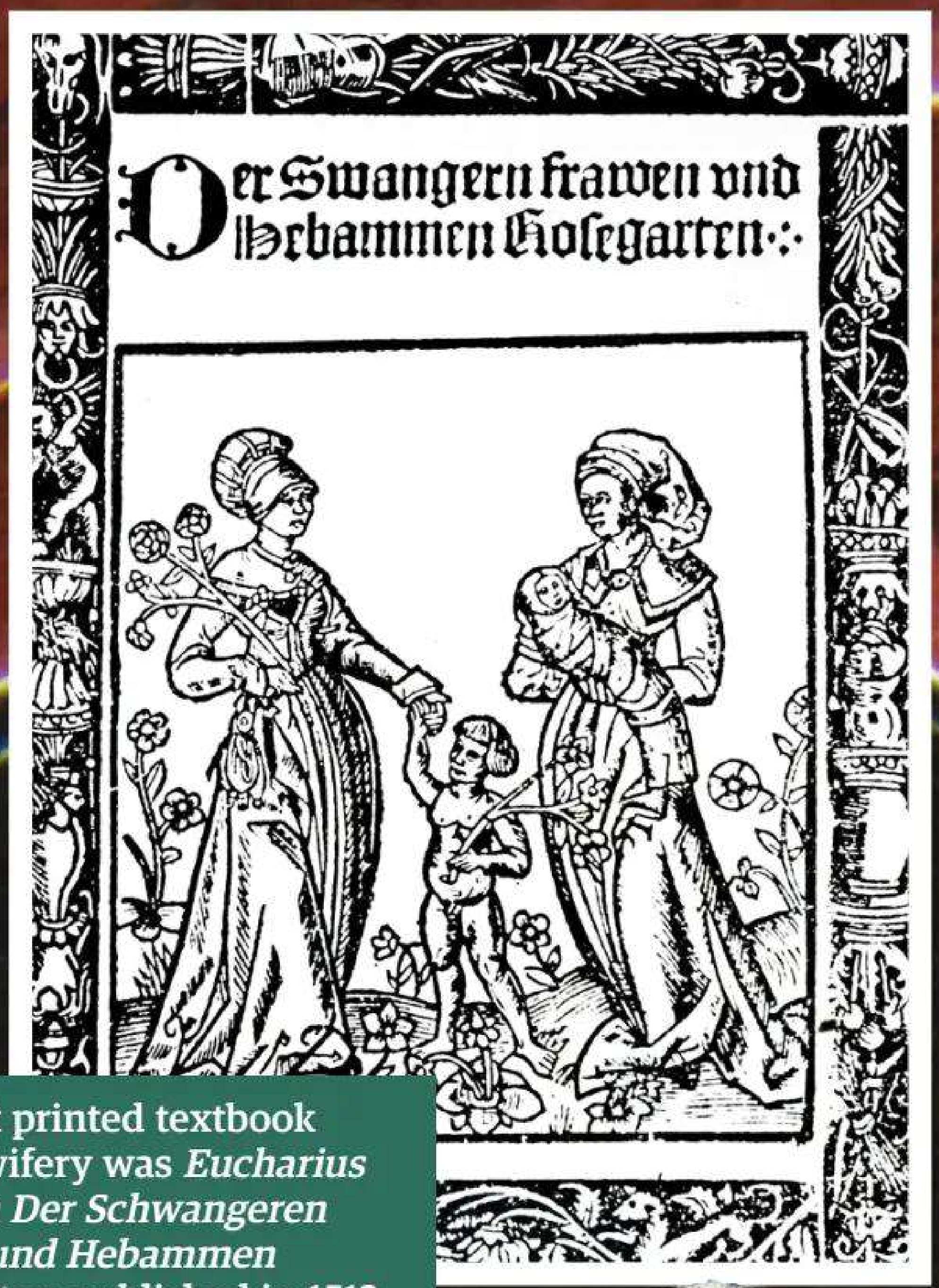
During the medieval era, medicine was men's work. Physicians were male, working from textbooks written by men, with the focus on the health of men. In fact, so paternal was medical care that male physicians preferred not to involve themselves with pregnancy at all, believing instead that women should be treated by other women. Because of this proscription, medieval midwifery was solely the preserve of female practitioners.

Most medieval midwives had received no medical training and, as it was a profession that was often handed down from generation to generation without formal education, many midwives of the era came from the lower classes. In this intergenerational manner, girls who were intended to become midwives would begin their informal training very early, attending the labour of family members and learning on the job as the years passed. However, whilst women were present at the birth and during labour, men were usually not permitted to observe the midwives at work.

Midwives practised in all social classes, from the most poor to the wealthiest in society. A trusted midwife with a good reputation in some parts of Europe could receive a small pension for their service, whilst those who had the fortune to serve royal courts could expect the rewards to be commensurate with their illustrious patrons. Of course, there were risks inherent in the job too. Midwives could be subject to accusations of witchcraft should they transgress too far into the medical field, which was protected by the men who dominated it.

Childbirth in the medieval era was fraught with hazards, so the guidance of a skilled midwife was invaluable. Many midwives worked in teams to pool their knowledge and expertise; if a woman was fortunate enough to have a birthing chamber, it was the midwife who prepared this restful space and it was to here that the mother-to-be would retire a few weeks before her delivery date. Giving birth in a hospital was almost unheard of in anything but exceptional circumstances, so the depth of knowledge possessed by a woman's midwife could literally be the difference between life and death.

Sadly, because so many of the midwives were uneducated and so much of their teaching was passed down verbally, their knowledge has been lost to time. Few textbooks were written by medieval midwives and the vast majority of their names will be forever unknown. Unlike the male physicians remembered by posterity, these women's achievements must go unmarked.



Der Swangern frawen vnd
Hebammen Roſegarten :·

The first printed textbook on midwifery was *Eucharius Poesslin Der Schwangeren frawen und Hebammen Rosegarten*, published in 1513

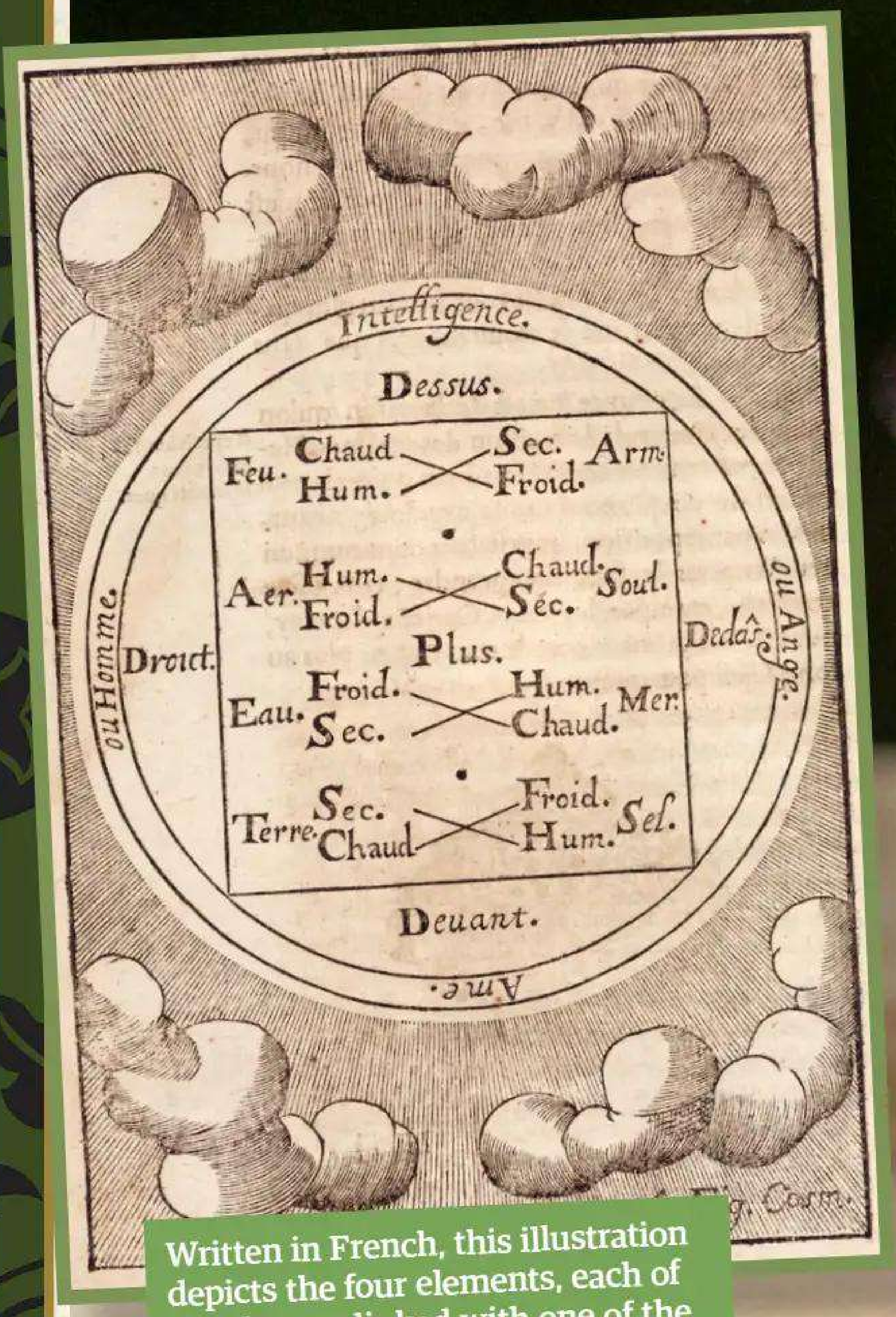
Women of every class relied on the knowledge and learning of their midwives; the birthing chamber was no place for men

Midwives passed their expertise down through generations of women and a trustworthy practitioner was worth her weight in gold

HERBAL REMEDIES

Mother Nature has been providing healers with powerful antidotes and soothing treatments since humans first began to study plants, and by the medieval period herbs were a crucial ingredient in the world of medicine

Words Bee Ginger



Written in French, this illustration depicts the four elements, each of which were linked with one of the four humours

Herbalists dedicated their lives to growing, drying and studying plants

Herbs have been linked with magic and medicine for thousands of years by many cultures. By the Middle Ages they were an important part of everyday life, playing a crucial role in the pharmacopoeia of the time.

The study of plants, flowers and herbs was predominantly undertaken by monks, whose efforts to unlock the medicinal potential of plants spanned far beyond the walls of their monastic gardens, their knowledge helping them to write countless classic texts that went on to assist future breakthroughs.

As monks worked to enhance their understanding of nature their gardens started to flourish. Monasteries began to produce herbal cures and welcome the sick, who visited in order to receive a healing hand. Herbs, resins and spices were often combined to create medicines, with each one boasting its own unique quality. Coriander, for example, was used to treat a fever; hemlock and henbane could alleviate aching joints; and stomach issues were quelled with a mixture of mint, balm and wormwood.

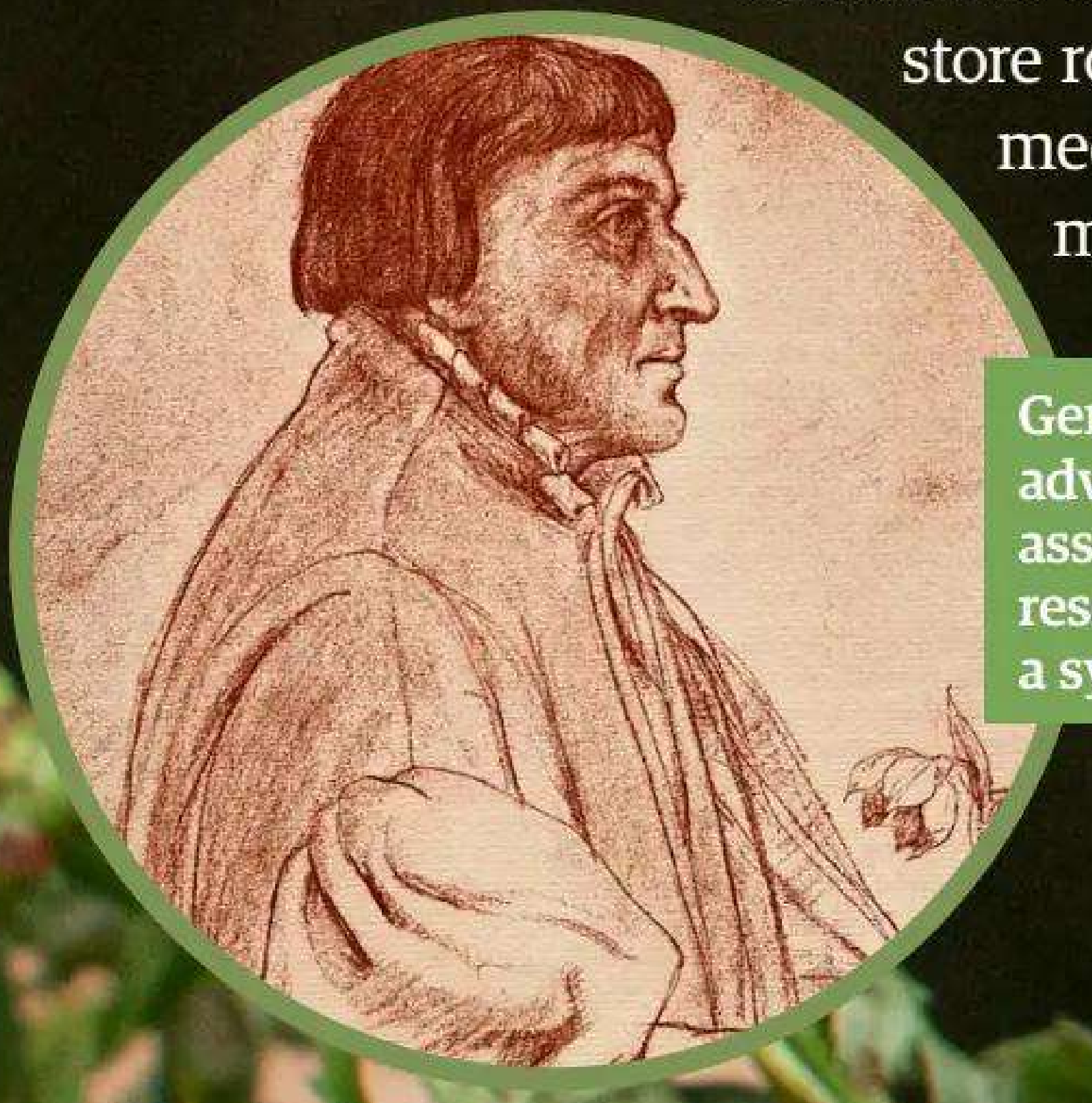
Herbs could also be acquired from apothecaries and herbalists or foraged from forests and fields. Commonly used herbs included nettle, rosehips, elderberries, yarrow and comfrey, garlands of which would often be found adorning people's homes. Sage (salveo), whose botanical name translates as "I am well", was and still is used for both ailments and cooking.

Herb baths featuring fragrant plants and woods were also frequently prescribed to assist a number of ailments as it was thought they created beneficial vapours. Ingredients were often combined with honey, ale, milk and vinegar, which was also used as a cleaning agent to kill disease and sterilise wounds.

Herbal remedies and plant knowledge were passed down through the generations, not just by healers and monks but also by mothers to their daughters and granddaughters. This created opportunities for women who served as healers, herbalists, nurses and midwives.

Some herbs were thought to display their usefulness by their resemblence to the body part that they were thought to treat. Lungwort's spotty, oval-shaped leaves were thought to resemble diseased lungs and it's still used in alternative medicine today to treat breathing ailments, although there is no scientific evidence that it's actually useful in treating lung or respiratory disorders.

The legacy of the monks who did so much to aid the progress of herbalism lives on today. If you happen to wander round the grounds of a stately home or garden centre you might notice that many herbs and plants bear the title 'officinalis'. This is in honour of the officina, the store room where the monks stored their medicines and the herbs they used to make them.



German botanist Hieronymus Bock advanced the study of plants by assembling them based on their resemblance or relation to each other, a system of classification he created

Medieval treatments often involved strange ingredients and techniques that look brutal but had a strong theory behind them

WEIRD AND WONDERFUL MEDIEVAL CURES

Going to a medieval doctor or healer could involve consuming and doing some very strange things – was it worth it?

Words Ben Gazur

Reading about medieval medicine can at times feel like someone is playing an elaborate joke. Surely no one tried any of the strange cures that old medical texts prescribe? Yet we know from archaeological digs that many of the plants described as useful were grown, harvested, and preserved for use by healers. We should not doubt that people in the past did try some weird and wonderful ways of regaining their health – and nor should we judge them too harshly.

Many medieval cures that seem bizarre to us made perfect sense to our ancestors given their understanding of the universe. There was no concept of germs or viruses but they did know that foul smelling places were often a source of disease. Today we might think such places are contaminated with toilet waste or decay but to the medieval mind it was the stench itself that spread sickness in what is known as miasma theory. This is why many doctors used sweet smelling herbs and spices, or fumigated sickrooms with burning incense. Occasionally they would blast aromatic fumes directly onto the anus or vagina. Before laughing at such practice we should note that modern women can buy vaginal steamers from the internet at great price which they are instructed to sit over while mugwort vapour coils around their nether regions!

Antiquity of ideas was highly valued by educated medieval people as it showed the depth of their learning and linked them to the great thinkers of the past. This had the unfortunate side effect of allowing mistaken notions to persist for centuries as people clung to old texts as infallible. The ancient theory of needing to balance the four bodily humours for health subjected patients to unnecessary bleeding to reduce their levels of blood or harsh emetics to force them to vomit up excess bile. But it made sense at the time.

Desperation was surely behind many of the unbelievable medical techniques used in the medieval period. With nothing effective that doctors could do to aid their patients, anything was worth trying. Sick people turned to magic, ritual, and painful remedies that at least offered the promise of a cure. Some of the cures on offer strike modern readers as insane – but to a person facing an agonising death or long-term debility they gave hope. Here are some of the weirdest medical treatments that should definitely not be tried today, even under the guidance of a medical professional.

Maternal mortality rates were high and doctors were poorly trained to help women in general

PROBLEMS IN BIRTH

Childbirth was one of the most dangerous moments in medieval life, for both mother and child. The first textbook for female health in Europe, *On the Diseases of Women*, purported to be written by an 11th century doctor called Trotula and included many tips for helping women in labour.

In a difficult birth on no account should any men treating her look at the mother's face in case the shame stops the labour. Next magical words should be written on cheese or butter and fed to the struggling mother. If this fails to have the desired effect then a skin shed by a snake can be tied around her waist - perhaps a sympathetic form of magic to aid the release of the baby in the same way the snake escaped its skin.

If the afterbirth refuses to come out following birth then burning fish eyes, horse hoof, or cat dung underneath the mother was said to help.

> "MAGICAL WORDS SHOULD BE WRITTEN ON CHEESE OR BUTTER AND FED TO THE STRUGGLING MOTHER"

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THE LIVE CHICKEN CURE

Few diseases struck fear into medieval Europe like the Black Death. Once signs of plague appeared on a person there was little hope for their survival yet medics tried everything they could to help. It seemed that sucking the poisons from the swollen buboes offered the best hope for the patient.

The 'live chicken cure' became a popular option in medical texts. It was first described in 1348 and says that after the buboes have been cauterised a doctor should pluck the feathers from the rump of a chicken and place it on the swellings to suck out the poisons.

A later text says that several chickens are needed. They should all be roosters and have their posteriors plucked. The doctor should apply one to the bubo until the rooster dies and then replace it with a live one. When a rooster survives for a long time the poison has all been extracted and the patient will live.

Applying live animals to the painful swellings of plague victims was likely highly unpleasant

Animal ingredients in medicine were common and rare animals were thought to have more power

FIRST SALT YOUR OWL

The excruciating pain of gout can be hard to treat even today so it is no surprise medieval doctors tried all manner to medicines for gout. One of the most unusual instructs physicians to:

"Take an owl and pluck it clean and open it, clean and salt it. Put it in a new pot and cover it with a stone and put it in an oven and let it stand till it be burnt. And then stamp [pound] it with boar's grease and anoint the gout therewith."

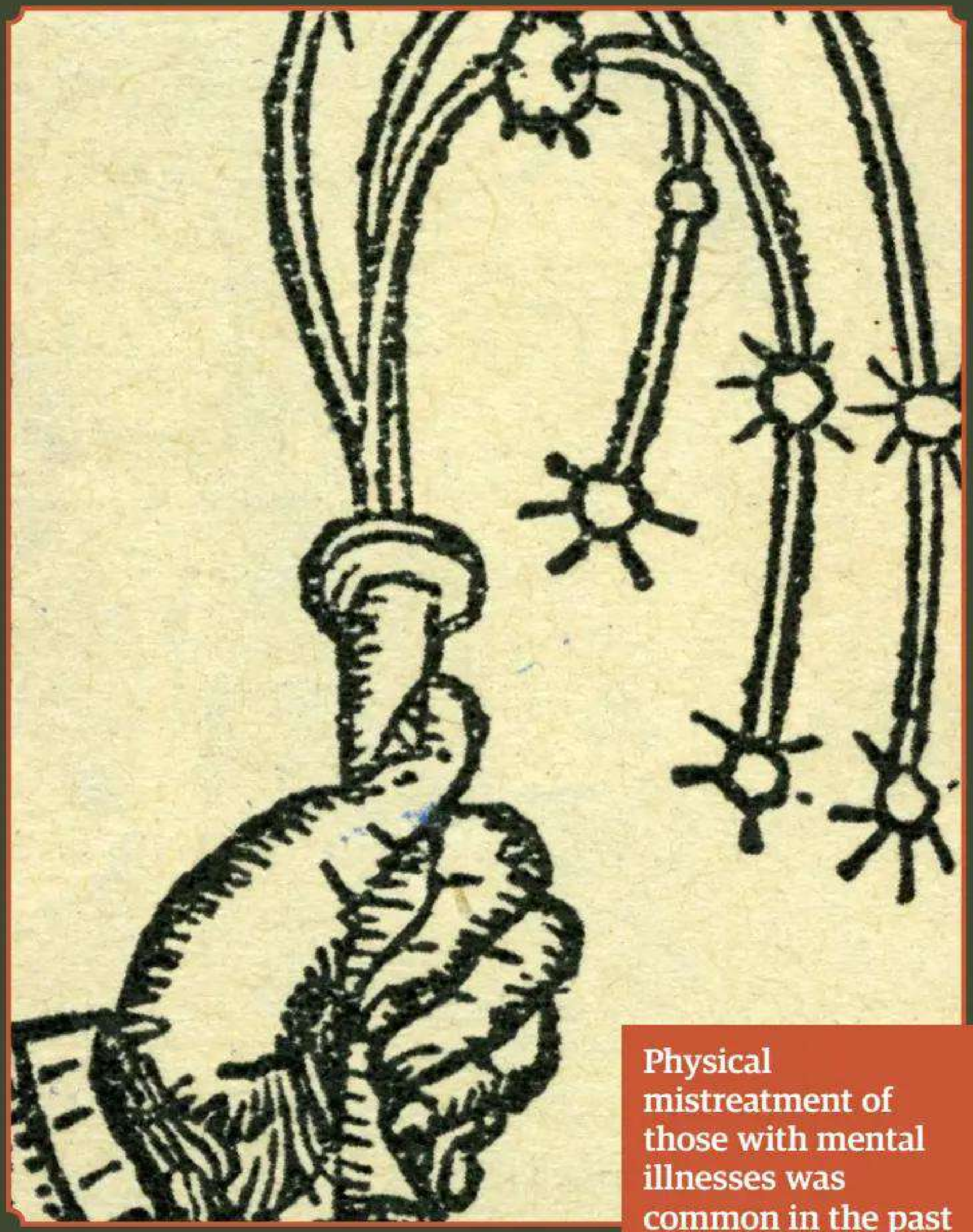
Whether this complex ointment was more effective than any other soothing creams is dubious.

WHIP THE MADNESS AWAY

Mental illness was poorly understood in the past and treatments for those determined to be insane could be cruel. *Bald's Leechbook* gives one particularly creative Anglo-Saxon cure.

First the doctor must catch a mereswine - a dolphin or porpoise. The skin of the animal should then be stripped and used to fashion a whip. With this the mad person should be flogged until they are better. The text informs concerned readers that this will be 'soon.'

Later thinkers considered madness to be caused by devils and demons and suggested prayer and holy intervention were the keys to treatment.



Physical mistreatment of those with mental illnesses was common in the past

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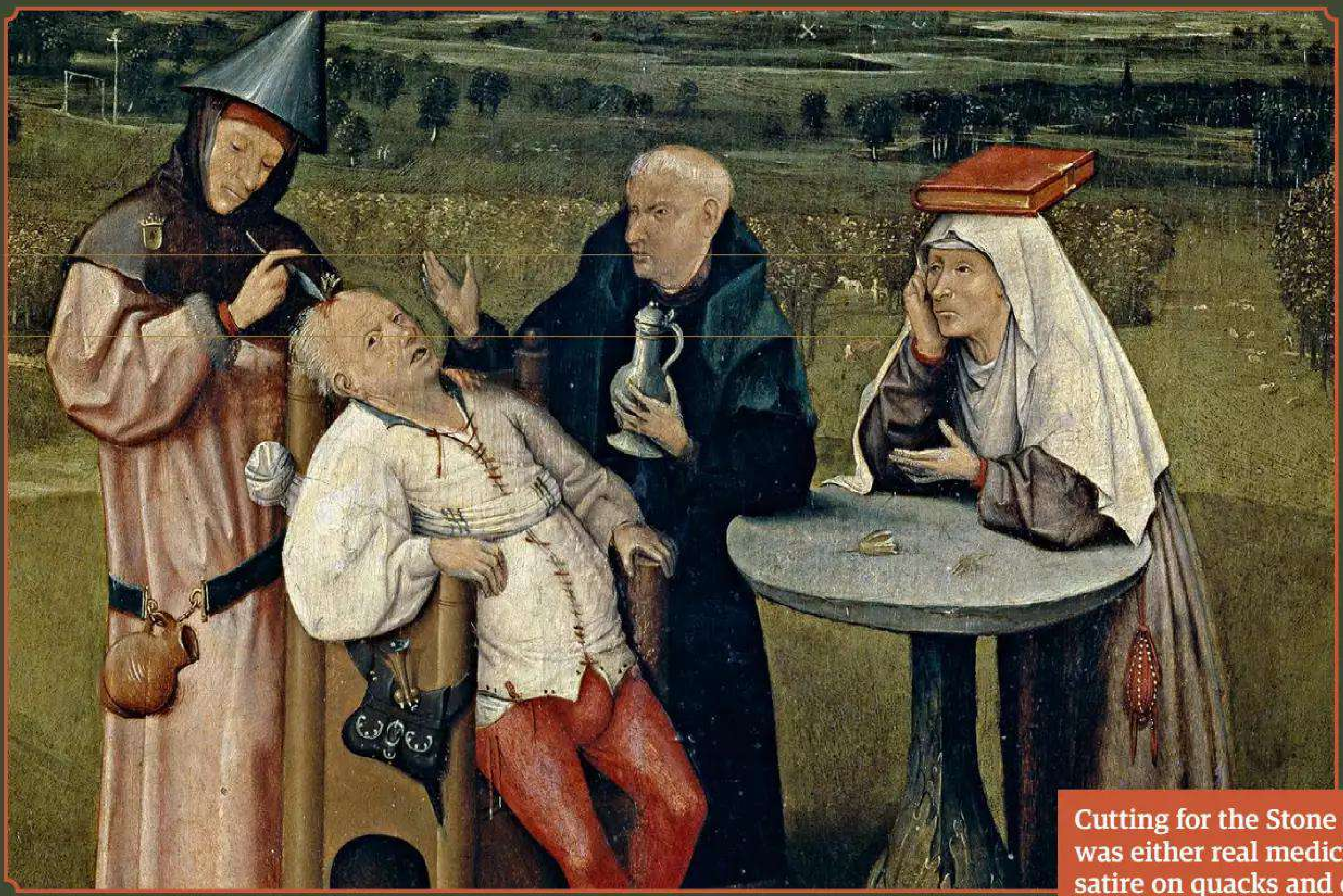
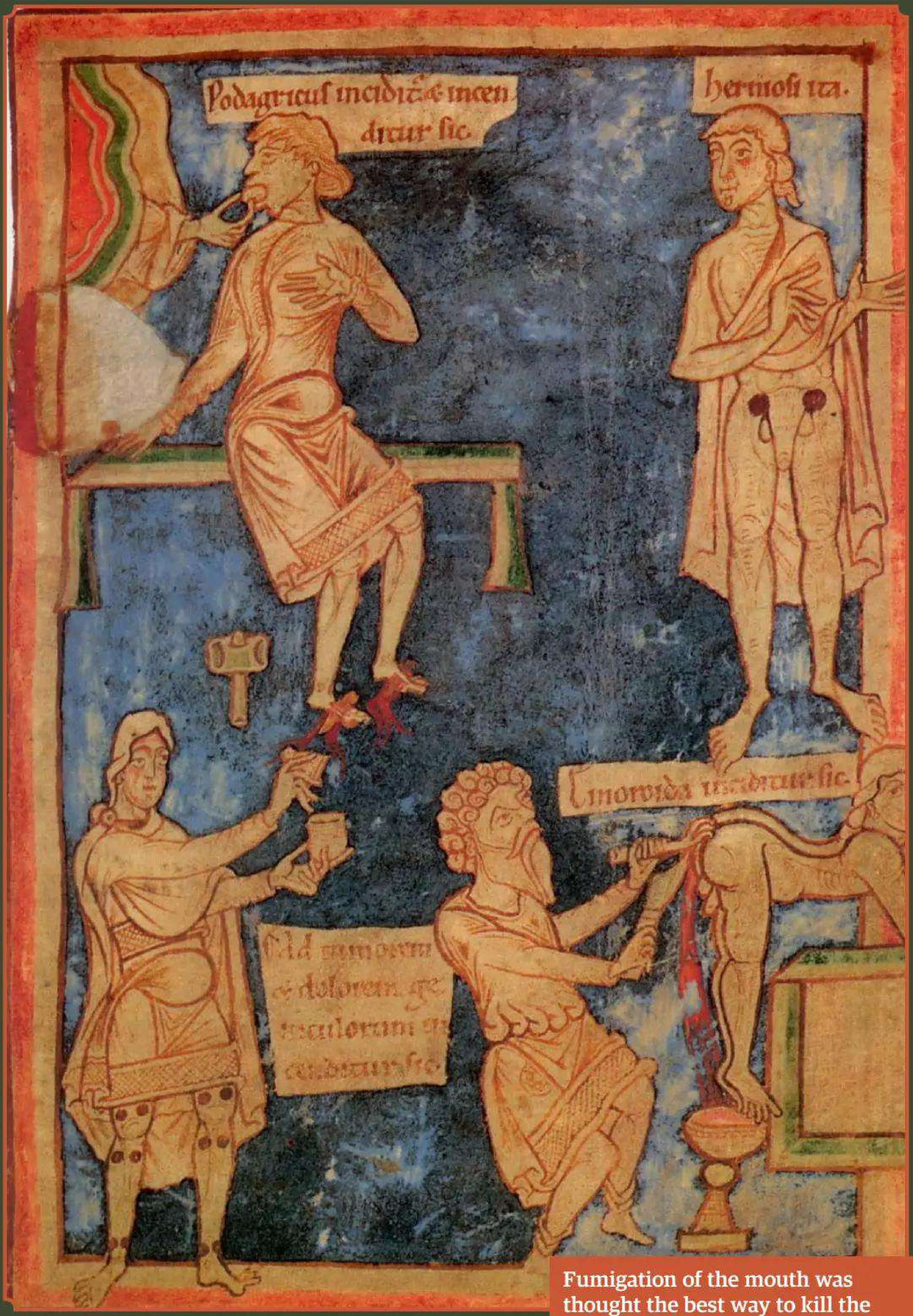


Cutting for the Stone of Madness was either real medicine or a satire on quacks and charlatans

THE STONE OF MADNESS

From the 15th century a strange type of painting began to emerge in the Netherlands. In the images a patient can be seen sitting in a chair while a physician cuts into their scalp. From the head is pulled a small stone known as the Stone of Madness. It was thought that mental illness might be caused by a stone that formed in a person's head.

Several of these pictures exist but there is no certainty that such operations were ever actually carried out. It may be that they were created to mock charlatans that promised miracle cures but really only took money from credulous and desperate people.


Podagricus incidit & mcen dratur sic.
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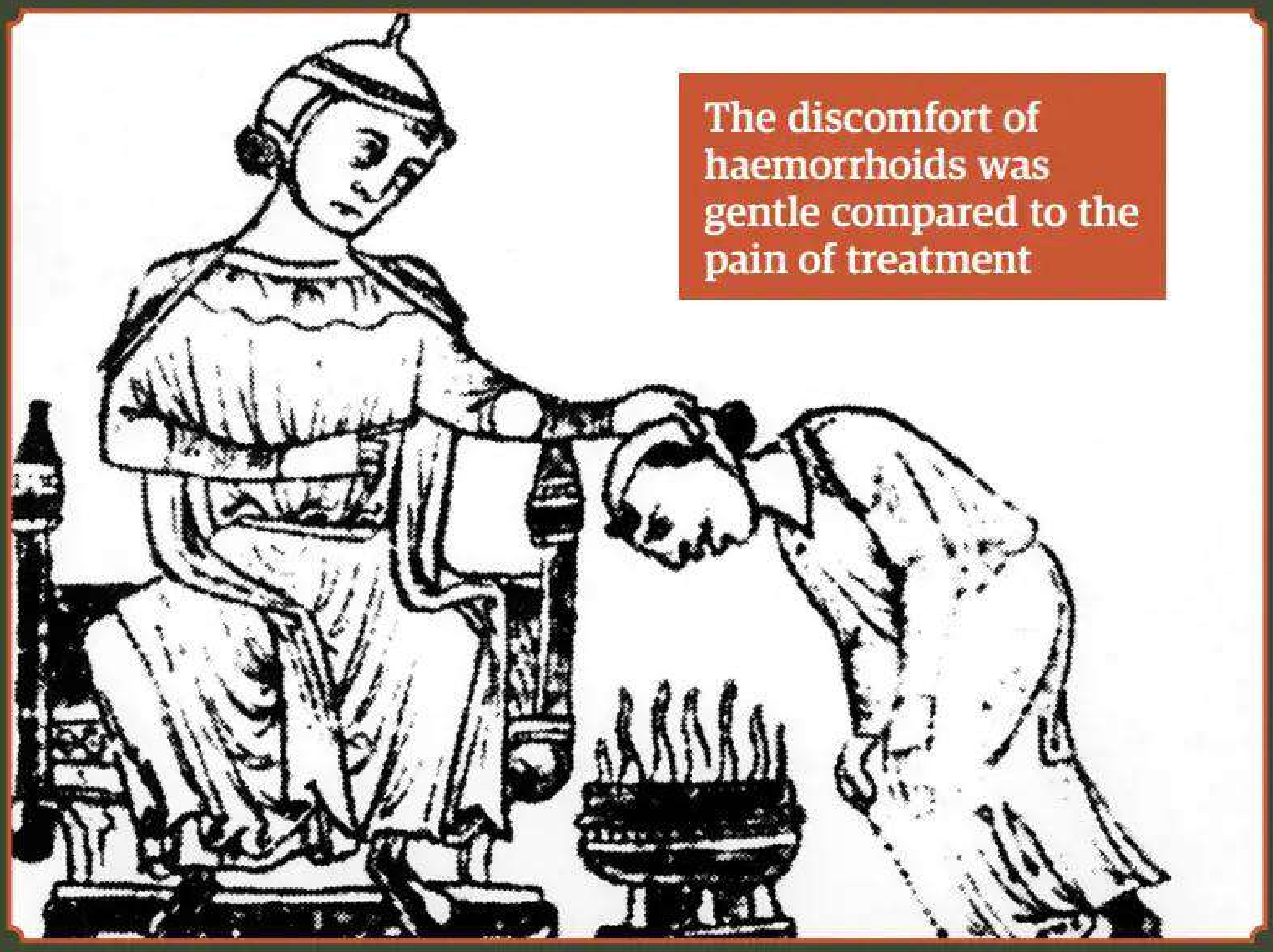
Fumigation of the mouth was thought the best way to kill the worms believed to infect teeth

CURING TEETH WORMS

Many ancient cultures believed toothache was caused by a worm which spontaneously grew in teeth. In the medieval era the most common treatment for the tooth worm was to make a candle of wax and henbane seeds and burn this so that the smoke went into the patient's mouth. A cloth should be placed underneath and the worms would be seen to fall onto the cloth.

It was only in the 16th century that doubt was cast on this treatment. Jacques Houllier pointed out that when henbane seeds burn they burst into small black bits that look like worms, regardless of whether the smoke ever went near a mouth.

> "THE BEST CURE WAS TO FIND A FISH INSIDE ANOTHER FISH. THE SMALLER FISH COULD THEN BE ROASTED"



The discomfort of haemorrhoids was gentle compared to the pain of treatment

A BURNING SENSATION

Haemorrhoids are swollen structures around the anus which can become painful, infected, and cause bleeding. The early medieval period saw them being treated with cauterisation using hot irons or needles. Alternatively surgeons were told to grasp them firmly and cut them off.

A 14th century text by Henri de Mondeville instructed doctors to simply leave haemorrhoids alone as operating on them often caused complications. For sufferers however relief could come from the patron saint of haemorrhoids, St Fiacre. The monastery of St Fiacre held a stone which was said to cure patients when they sat on it.

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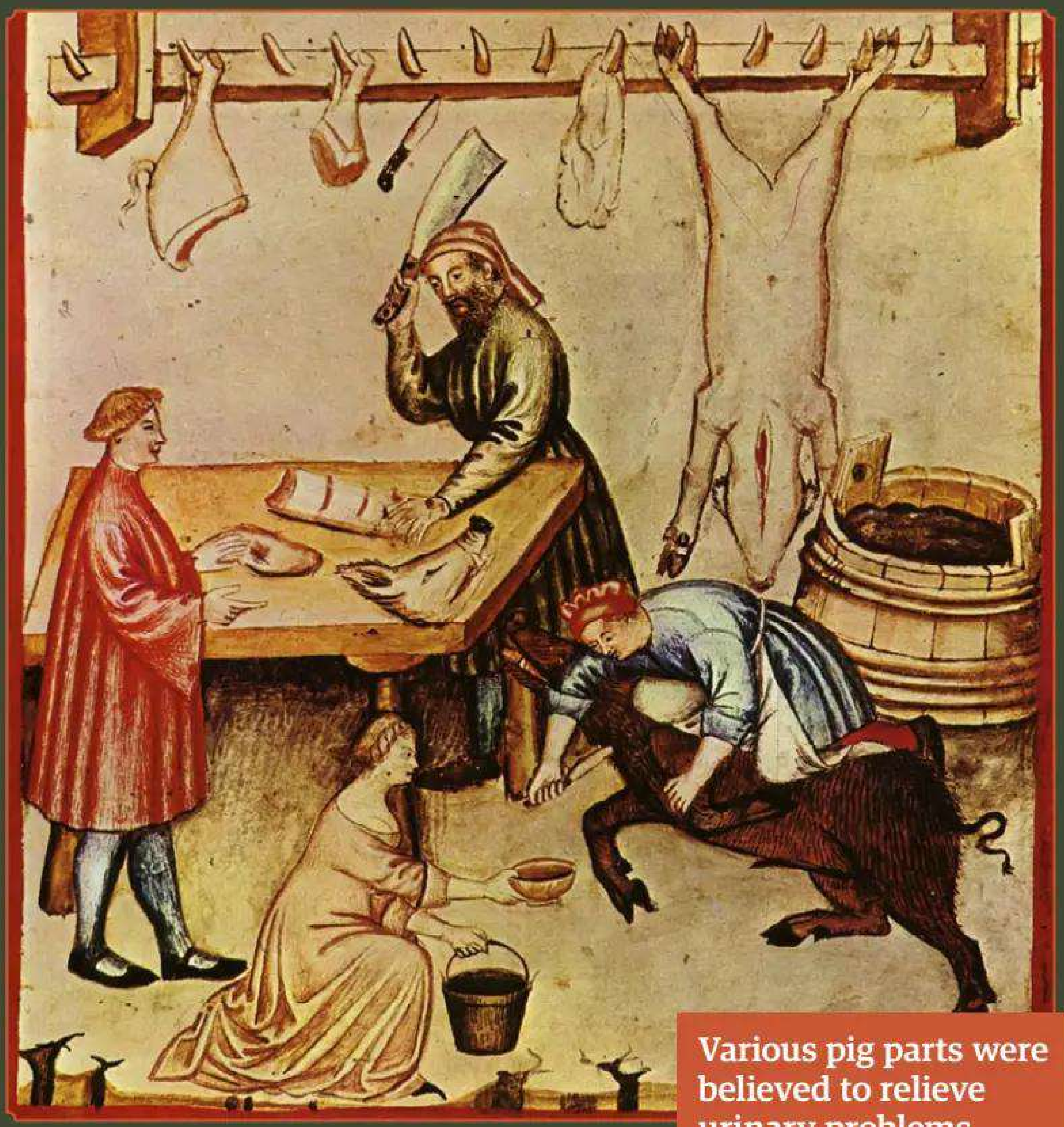


Various pig parts were believed to relieve urinary problems

URINARY TROUBLES

Bald's Leechbook reveals several medicines for men who are incontinent. First the trotters of a boar should be burned until they turn to ash and this should be sprinkled in the patient's drink. If that fails then the ashes of a bladder from a pig that has been castrated could be tried.

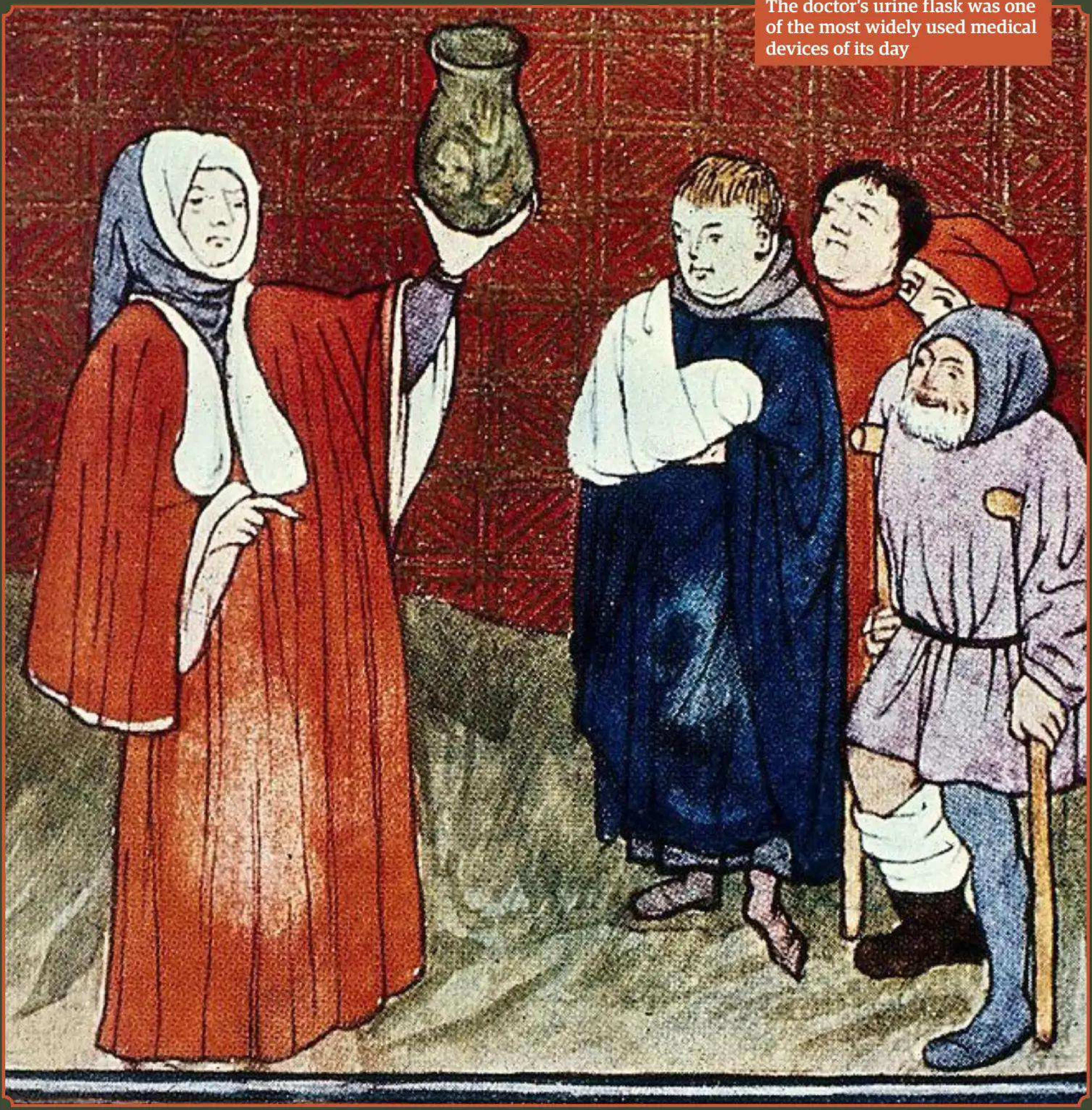
If the man was unable to urinate then he should try feasting on roast goose tongues. The best cure however was to find a fish inside another fish. The smaller fish could then be roasted and flaked into the patient's drink.

EXAMINE YOUR URINE

Uroscopy, the examination of a patient's urine, had been developed by the Greeks and Romans as one of the means of diagnosis. It fell out of favour in Western Europe until the translation of Byzantine and Arabic texts in the 12th century. From then on it was an indispensable tool for physicians and all doctors would carry a matula - a clear glass flask - with them for urine analysis.

Once the urine had passed into the hands of the doctor they would check it for a range of things from cloudiness to viscosity. Most valuable of all was the colour of the urine. Illuminated manuscripts were created which showed an array of possible colours, from "white as well-water" to blood red, and what they might indicate. If all else failed the urine could be tasted.

The urine flask became the symbol of healers and so those looking for treatment should look for the person holding up a bottle of urine.



The doctor's urine flask was one of the most widely used medical devices of its day

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Stones supposedly extracted from a toad's skull were used to avoid poisoning

PREVENTING POISONINGS

Deadly poisons have been used in murders for millennia. In the medieval period a range of substances were thought to ward off their harmfulness. Toadstones were said to form naturally in the heads of toads and, if worn in jewellery, could stop you being poisoned. In fact the stones were the fossilised teeth of a fish. Bezoars, stony concretions that form in ruminants' stomachs, were scraped into drinks because it was said they neutralised poisons. Unicorn horns, actually narwhal tusks, were also used for this.

If you were poisoned a number of cures were available. *Bald's Leechbook* lists several herbal concoctions and also says snake poison can be cured by washing a slug in holy water and drinking it. The most valuable medicine against poison and disease in medieval Europe was theriac, a sugary treacle with dozens of costly imported ingredients like spices and viper flesh. It did contain opium so may have at least reduced pain.

Medieval rulers and aristocrats were especially interested in remedies for poison as it was a surefire way for assassins, disgruntled underlings or princes-in-waiting to dispose of them. Mithridate, a concoction similar to theriac, was a purported universal antidote. Mithridatism meanwhile was the act of micro-dosing poisons in order to apparently buid immunity to them.

MARVELLOUS MEDICS

Meet ten men and women who had a lasting impact on medicine in the medieval world

Paul's work has been translated into multiple languages

PAUL OF AEGINA

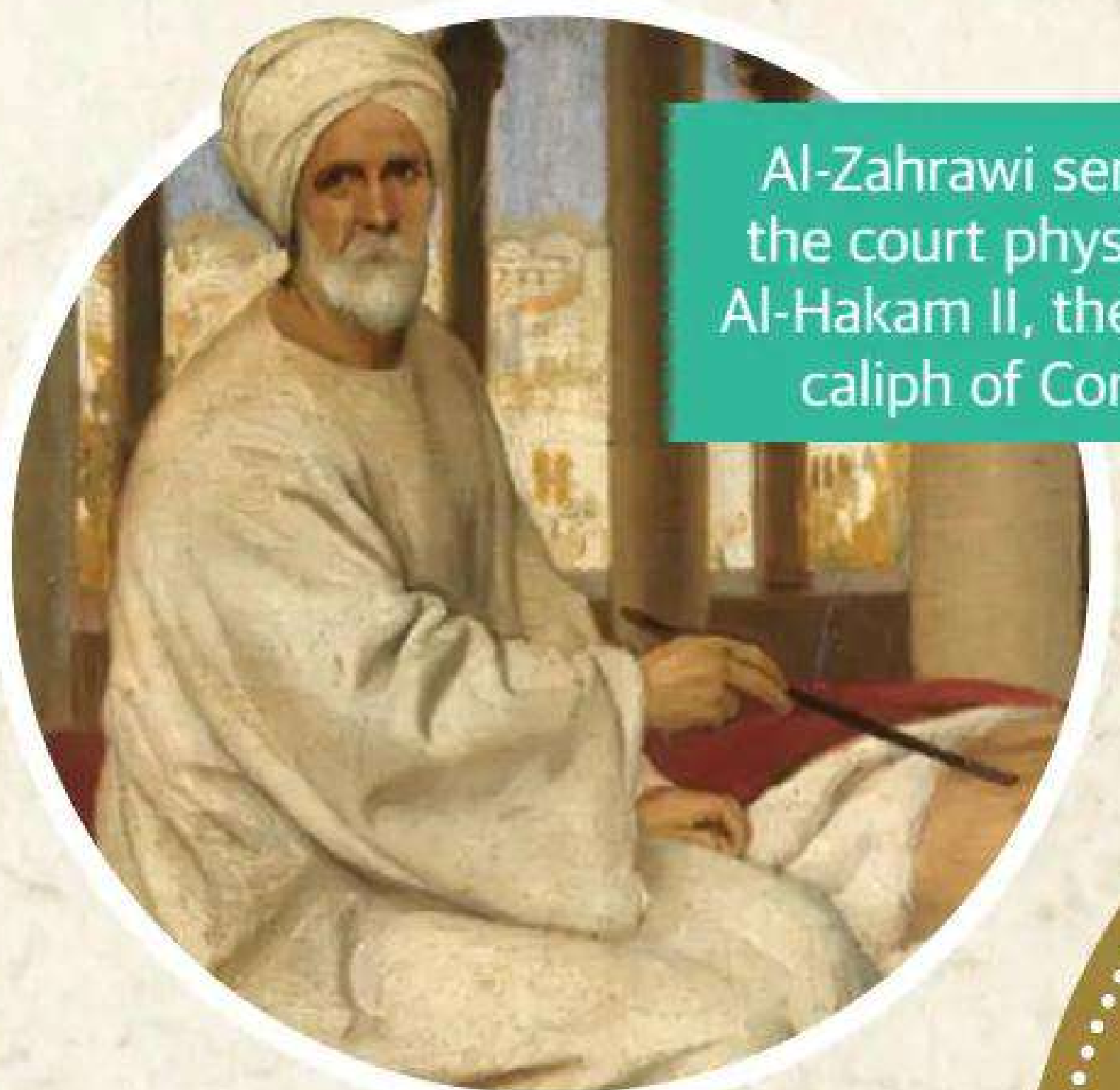
BYZANTINE C.625-690

Paul was one of the most prominent physicians of the Byzantine period. He studied medicine in Alexandria, Egypt and was also exposed to Arabic medicine through his travels to the Middle East. He wrote *The Epitome of Medicine*, comprising of seven books on various subjects including hygiene and toxicology, combining the work of Hippocrates and Galen with new medical procedures, such as cauterisation. It was highly influential and remained as the standard guide for medicine and surgery for 800 years.

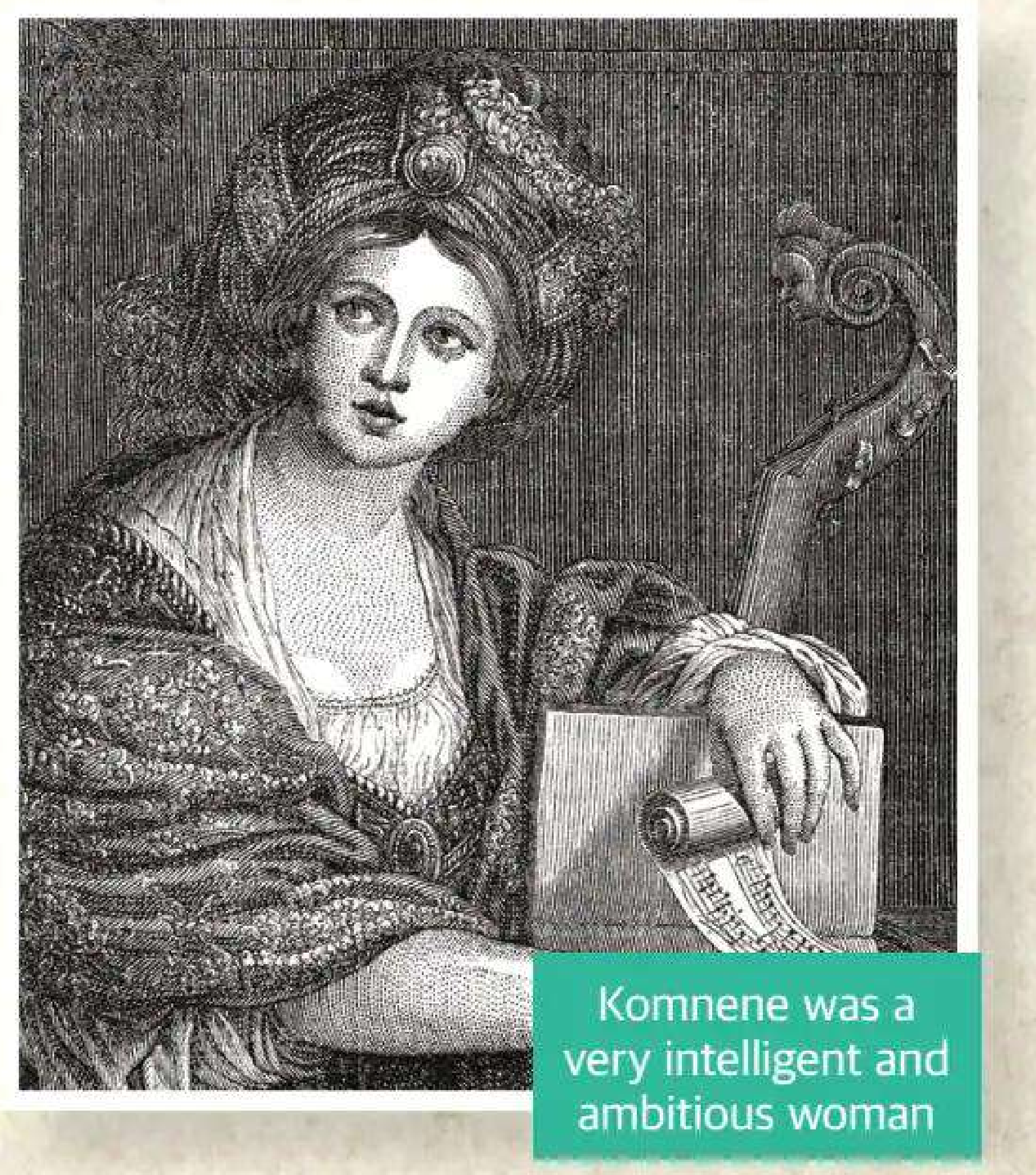
AL-ZAHRAWI

SPANISH 936-1013

Widely hailed as 'the father of modern surgery', Al-Zahrawi was the greatest surgeon of the Islamic Golden Age. In roughly the year 1000, he completed his 30-volume illustrated medical encyclopaedia *Al-Tasrif*, which was intended for medical students. Documenting Al-Zahrawi's almost 50 years of medical experience, it discussed human anatomy and the pathology of diseases among other topics. It was influential on the development of both Islamic and European medicine and surgery, remaining as the standard textbook in medical universities for 500 years. Aside from his encyclopaedia, Al-Zahrawi holds the distinction of introducing around 200 new surgical instruments to the medieval world.



Al-Zahrawi served as the court physician to Al-Hakam II, the second caliph of Cordoba

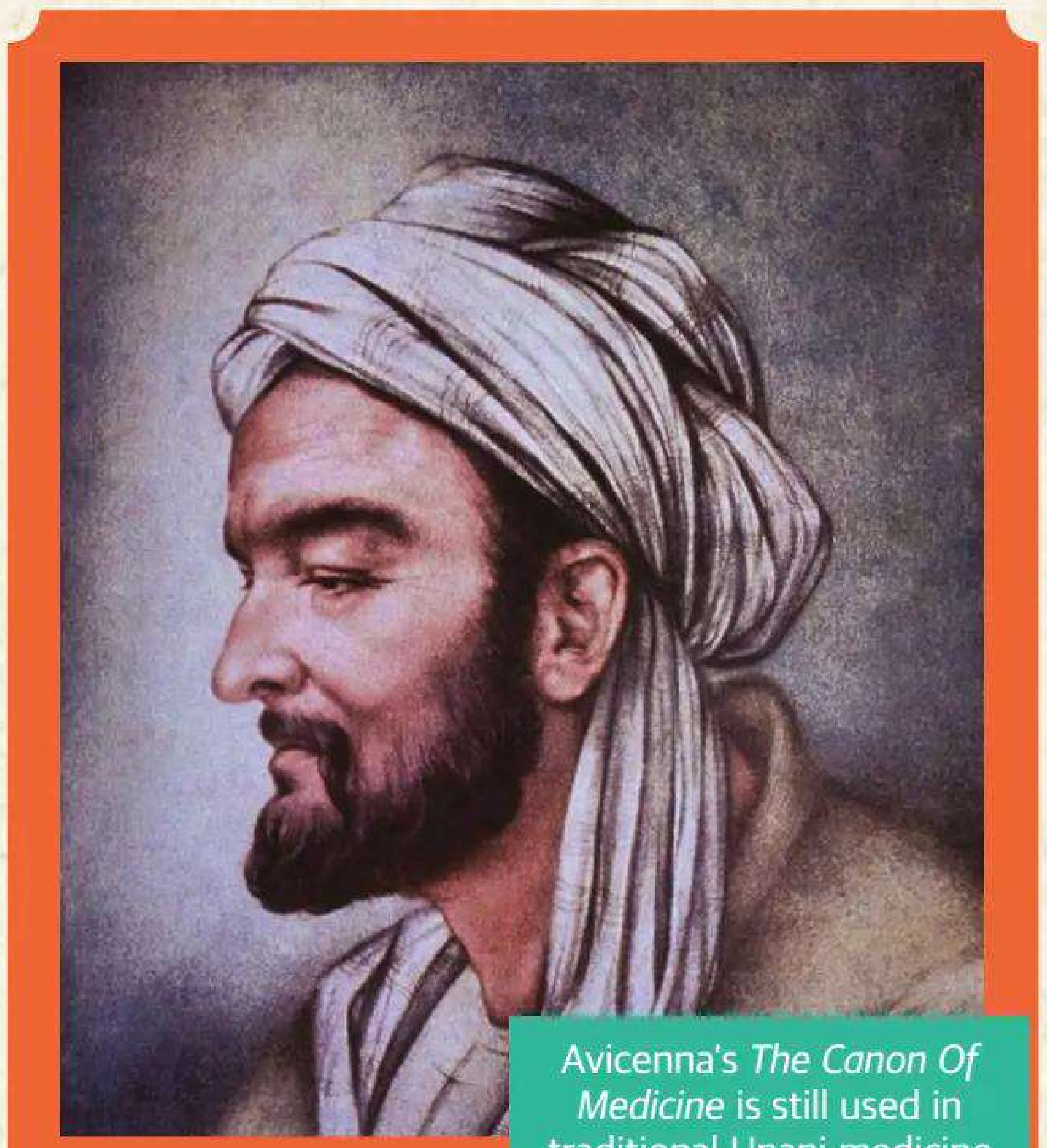


Komnene was a very intelligent and ambitious woman

ANNA KOMNENE

BYZANTINE 1083-1153

Byzantine princess Anna Komnene studied medicine from an early age, eventually developing a reputation as a good physician. Her father, Emperor Alexios I, placed Komnene in charge of a large hospital, as well as an orphanage, in the capital Constantinople. While in this role, it is believed that she treated thousands of patients and she was also known to teach medicine in various other hospitals. Interestingly, Komnene was deemed to be an expert in gout and personally treated her father when he suffered attacks.



Avicenna's *The Canon Of Medicine* is still used in traditional Unani medicine

AVICENNA

PERSIAN 980-1037

Regularly cited as one of the most significant physicians of the Islamic Golden Age, Avicenna wrote hundreds of works, many of which were dedicated to medicine. His most famous was the encyclopaedia The Canon Of Medicine, which remained in use until the 17th century as one of the world's most authoritative and famous medical textbooks. Avicenna was influenced by the work of Greek physician Galen, combined with Persian and Indian medicines. Although the majority of it has now been debunked by modern medical science, Avicenna provided great insight to areas such as anatomy and symptoms, and is often touted as a founder of preventive medicine.

> Avicenna was a polymath who wrote on an extensive number of topics including alchemy, psychology, mathematics and poetry

Ibn Zuhr had a keen interest in pharmacology

IBN ZUHR **SPANISH** 1094-1162

Ibn Zuhr was considered the most renowned physician of Muslim Spain. Born into a family of physicians, he trained in medicine from an early age and was introduced to the works of Hippocrates and Galen by his father, who made him swear the Hippocratic oath. He notably wrote the Kitab al-Taysi, focusing on clinical descriptions and diagnosis of diseases, at the request of his contemporary Averroes, to serve as a companion the latter's medical encyclopaedia, Colliget. Also known for introducing animal testing to evaluate new medical procedures, Ibn Zurh's work contributed greatly to the development of surgery in the medieval world.

Maimonides devoted much of his life to treating others

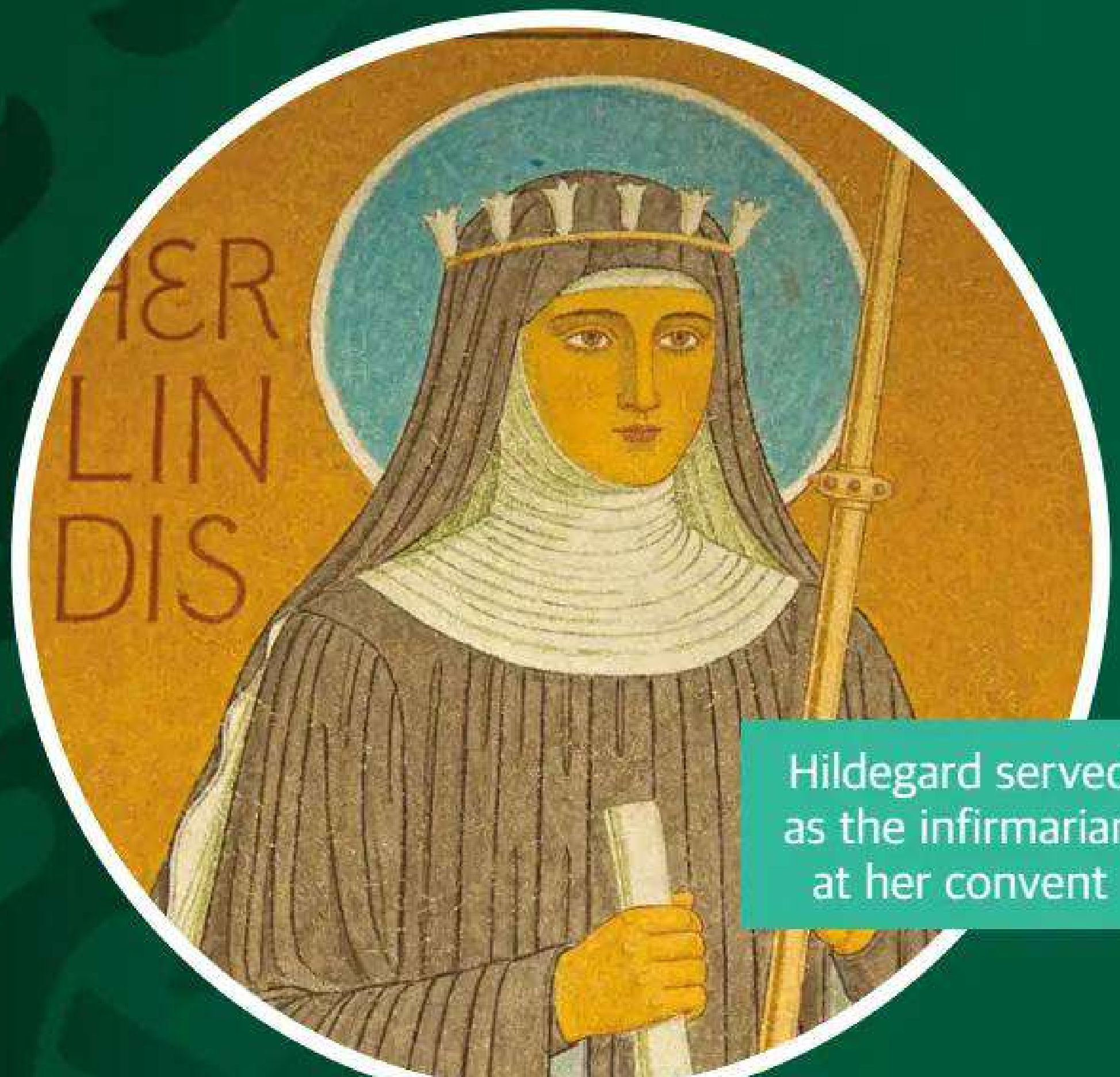
MAIMONIDES **SPANISH** C.1135-1204

First exposed to medicine while living in Morocco from 1160 to 1165, Maimonides's reputation as a physician earned him a place as the court physician to the sultan of Egypt, Saladin. Influenced by Greek and Arabic medicine, coupled with his own experiences, Maimonides wrote at least ten medical treatises, discussing conditions such as asthma and pneumonia. His work is credited with spreading medical knowledge amongst the Jewish community during the Middle Ages.

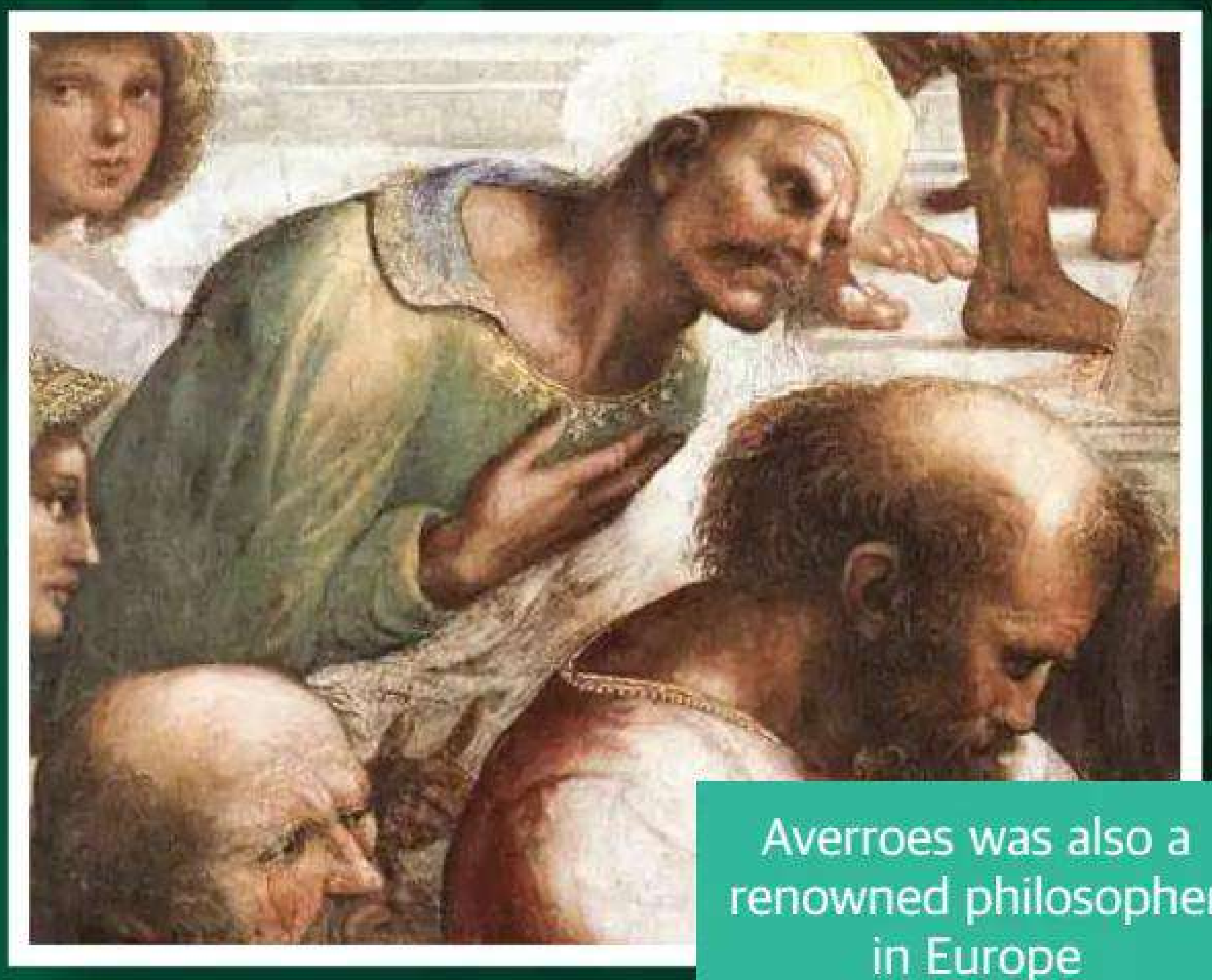
HILDEGARD VON BINGEN

GERMAN 1098-1179

Hildegard was a Benedictine nun who was known for her holistic approach to healing and herbal remedies. She was the author of the nine volume *Physica* and the five volume *Causae et Curae*, which between them covered a range of topics including human physiology, the medicinal properties of plants and herbal treatments. While it remains unknown exactly where Hildegard studied medicine, her writing suggests that she was familiar with folk medicine, Arabic medicine and the work of Galen.



Hildegard served as the infirmarian at her convent



Averroes was also a renowned philosopher in Europe

AVERROES **SPANISH** 1126-1198

Averroes, a physician at the royal Almohad court, was celebrated for his insight and knowledge in the field of medicine. He created a number of medical works, the most important of which was his first, the encyclopaedia *Book of Generalities About Medicine*, which he wrote in 1162. Also known by its Latin name, *Colliget*, it was split into seven books which discussed a range of topics, including anatomy, hygiene and therapy. The *Colliget* was focused on the theoretical bases of medicine and summarised the work of Galen, earning Averroes recognition in the Latin medical world.

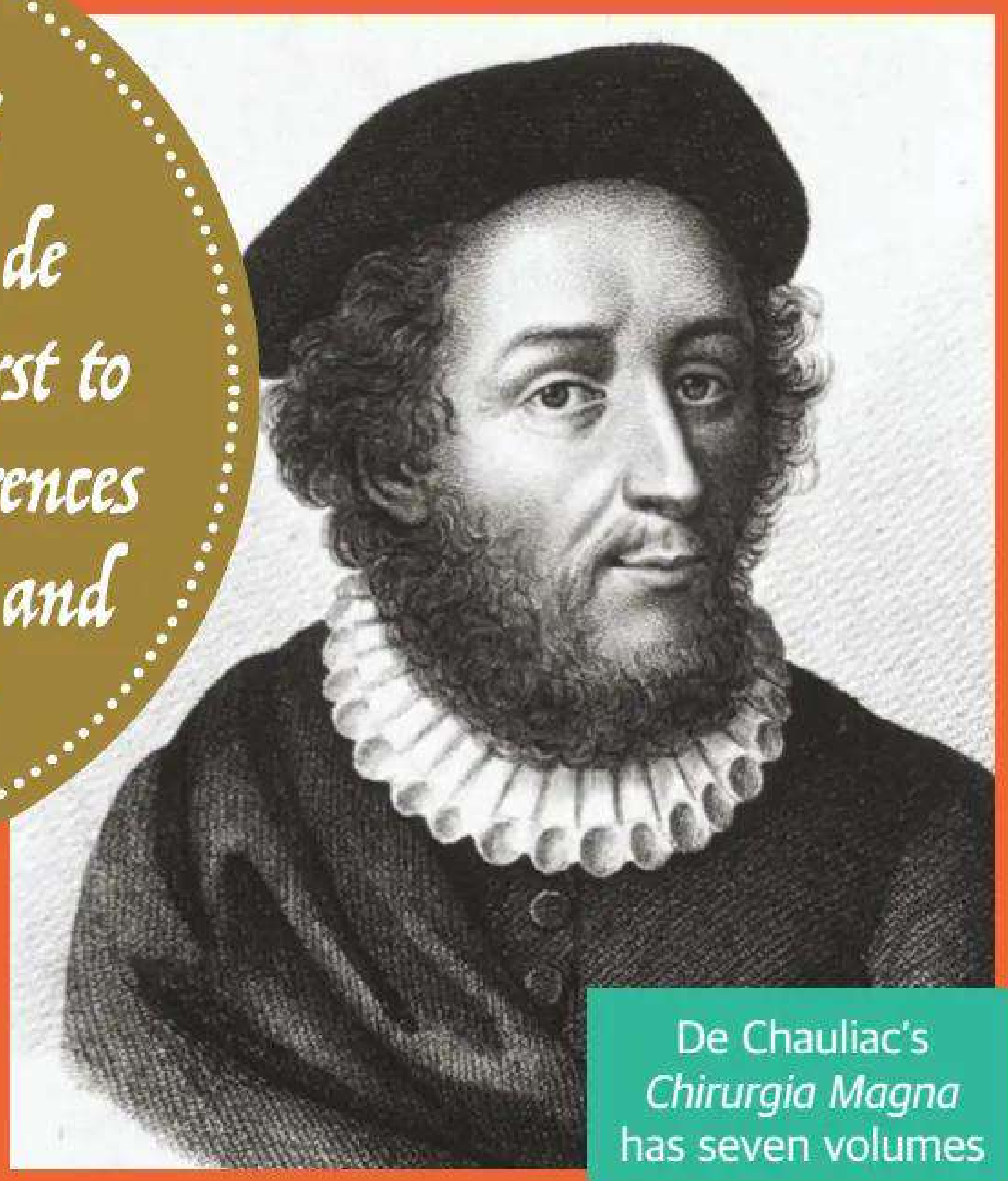
IBN AL-NAFIS

SYRIAN 1213-1288

Ibn al-Nafis made one of the biggest medical discoveries of the medieval world when he correctly described pulmonary circulation, with blood moving from the right side to the left side of the heart through the lungs. This contradicted the traditionally accepted view of Galen, where blood seeped from the right to the left ventricle through the chamber walls - it would take European scholars another three centuries to prove Ibn al-Nafis correct. He also predicted the existence of coronary and capillary circulations, 400 years before they were discovered, proving that he was a physician far ahead of his own time.

Ibn al-Nafis was known to have performed numerous human dissections

> During the outbreak of the Black Death, de Chauliac was the first to distinguish the differences between pneumonic and bubonic plague



De Chauliac's *Chirurgia Magna* has seven volumes

GUY DE CHAULIAC

FRENCH C.1300-1368

After studying medicine in Montpellier, Paris and Bologna, de Chauliac practiced as a physician in Lyon and served as the personal surgeon to three Popes of the Avignon Papacy.

He wrote the *Chirurgia Magna*, in which he discussed a variety of medical treatments and surgical procedures, largely influenced by the work of Galen. The *Chirurgia Magna* quickly became one of the most important surgical textbooks in the medieval world and remained as such for almost 400 years.

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JABIR IBN HAYYAN:

THE FOUNDER OF CHEMISTRY

Emerging during the dawn of the Islamic Golden Age, Jabir ibn Hayyan single-handedly pulled alchemy from its cloak of mysticism and transmuted it into a science

Words Hareth Al Bustani

Jabir ibn Hayyan was born in 721 CE in Khorasan, straddling Iran and Central Asia, towards the northeastern frontier of the medieval Islamic world. Under the leadership of the Umayyad dynasty, the Muslim empire had recently reached its remarkable peak, stretching all the way from Spain to China, via North Africa – all managed by a staggeringly efficient bureaucracy, inherited from the Sassanids and Byzantines. Trouble, however, was brewing for the empire.

As discontent spread amongst non-Arabs, a subgroup of Mohammed's Hashemite clan, known as the Abbasids, emerged in Khorasan, rustling up support for their own dynasty. Among their early supporters was Jabir's father, Hayyan, a Yemeni druggist who left his home in Kufa, Iraq, to stoke the flames of revolution. When the Umayyads caught wind of the emerging coup, Hayyan was captured and executed, forcing his family to flee to their homeland of Yemen. There, on the periphery, a young and curious Jabir buried himself in the Quran and mathematics, studying under the scholar Harbi Al Himyari.

In 750, the Abbasids finally overthrew the government, replacing the caliph with one of their own. They established a new capital near the old Sassanid heartland of Ctesiphon, the round city Madinat Al Salam – the City of Peace, later known as Baghdad. Jabir moved to his father's home in Kufa, and sought out the renowned Jafar Al Sadiq – a scholar and scientist, revered by the Twelver Shias as the Sixth Imam. Now around 30 years old, Jabir hurled himself into the worlds of alchemy, philosophy, pharmacy and astronomy. To accelerate his intellectual growth, he learned Greek, familiarising himself with the works of Plato, Socrates, Aristotle, Pythagoras and Democritus, as well as the mystical ideas of Apollonius of Tyana.

His mentor encouraged him to pay particular attention to the composition of substances derived from minerals, plants and animals. Jabir was fascinated by the writings of Khalid ibn Yazid, the

materia zem ex qua trahit
lutio fit: tertium
materia lapidis:
inqua
perficit
Geber:
phus:
Deus et natura nō faciunt frustra.
RIOVRABETI

son of a 7th century caliph, who speculated about turning base metals into gold. In this exciting new era, Jabir's enthusiasm came to embody the spirit of the times.

As the Abbasids cemented their foothold over the Caliphate, they inherited a realm twice the size of the Roman Empire, engulfing the intellectual heritage of the world's greatest academic centres. From the Greek libraries of the Near East to the Persian academy of Jundishapur, and the metallurgists of Egypt to the doctors of Damascus, it was a land overflowing with philosophical, scientific and mathematical treasures, just waiting to bear fruit. The rise of the Abbasids coincided with that of the Barmakids – a family from eastern Afghanistan whose support had been instrumental in the revolution. For his trouble, Khalid ibn Barmak was appointed tutor to the caliph's young son, Harun Al Rashid – a milk brother to his own child, Yahya.

Yahya himself grew into one of the most influential figures in the Islamic world, serving as chief secretary and counsellor, with control over the caliph's official seal. His sons were appointed viziers, or grand ministers. He patronised learning on a scale the Muslim world had never known before – translating countless texts into Arabic, importing the world's finest physicians and commissioning epic poems. When Harun Al Rashid was appointed caliph, he, too, encouraged his subjects to embrace knowledge, literature and academics. By now, Jabir had established himself as the leading light among a generation of luminaries. Although he steeped himself in the exciting allure of Sufi mysticism, he sought to lift the art of alchemy from the realm of esoteric conjecture into something more tangible and real.

He built his research upon a foundation of Aristotle's four elements – earth, water, air and fire – whose properties were hot or cold, and dry or wet. He divided the natural elements into three categories; spirits, which vaporise on heating, metals and stones – which can be converted to powder. Jabir also developed the 'mercury-sulphur' theory, which claimed that all metals derived their properties from their relative composition of 'mercury' and 'sulphur' – two hypothetical elements, relating to their metallic nature, and combustibility. Sulphurs, he speculated, derived their properties from "variation in the soils and in their positions with respect to the heat of the Sun".

When mercury and sulphur were combined to create a compound, he argued that each element remained unchanged in its "permanent natural form" within the newly created substance. "All that has happened is that their parts have become attenuated and in close approximation to one another, so that to the eye the product appears uniform," he wrote. However, by achieving the right balance of sulphur and mercury, he believed one could transmute a metal into the perfect compound – gold.

"HOW CAN A MAN IMITATE A THING OF WHICH HE KNOWS NOTHING?"

While philosophy and medicine were well respected among the nobility, alchemy had arrived under a cloak of superstition and magic. It was stigmatised as the trade of charlatans, even if Ali ibn Abi Talib himself had supposedly called alchemy "the sister of prophecy". Jabir validated his theoretical ideas with practical experiments, setting up a laboratory and studying the properties of various substances. Although much of his work remained dressed in the traditional language of mysticism, he established a scientific method – single-handedly transforming alchemy into chemistry. "Scientists," he said, "delight not in abundance of material; they rejoice only in the excellence of their experimental methods."

Chemistry, he defined as "a branch of natural science", one that "investigates mines and the manner in which, by the action of fire, metals are produced in them, since men desire by artificial means to imitate nature". He continued: "How can a man imitate a thing of which he knows nothing?" Through his extensive experiments, he discovered and documented an array of chemical operations, including calcination, crystallisation, sublimation, liquefaction, synthesis of acids, evaporation, oxidation, purification, amalgamation and filtration.

To facilitate the scope of his scientific ambitions, he invented his own apparatus, such as the retort, used to distil liquids. Along the way, he progressed methods of preparing various metals, dying cloth, tanning leather, developing steel, varnishing water-proof cloth, rust-prevention, the use of manganese

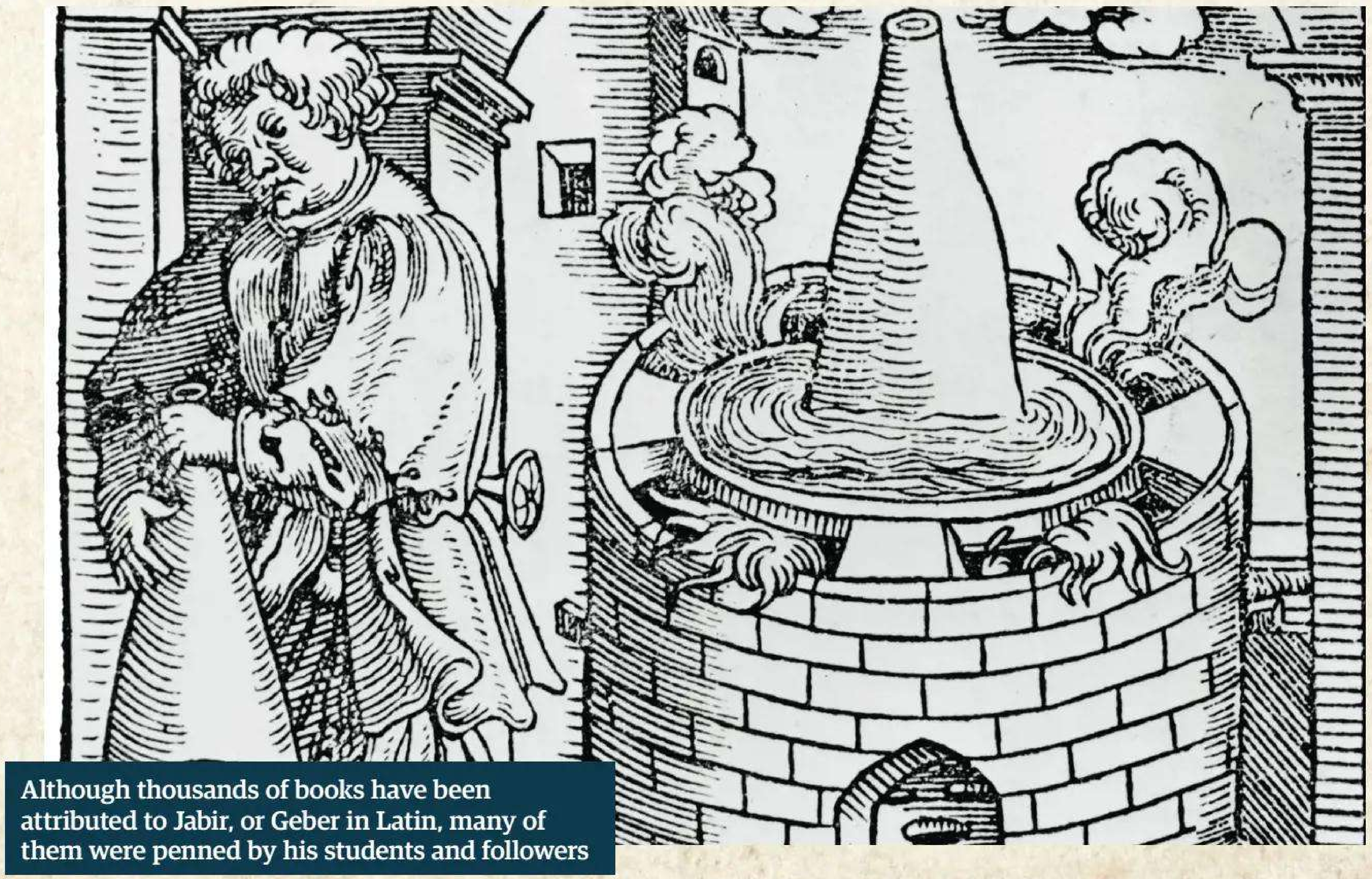
CORPUS JABIRIANUM AND THE PSEUDO-GEBER

A prodigious body of work has been attributed to Jabir, whose name adorns thousands of books, covering everything from alchemy to philosophy, and music to magic. Much of the 'corpus Jabirianum' was believed to have been penned by his students and initiates, in the two centuries following his death.

Several of his works were cited in the *Fihrist*, a 10th century-bookseller's attempt to index the entire bibliography of Arabic works to date. The author, Ibn Al Nadim, professed that while some scholars suggested the alchemist never existed at all, he believed that "the man is authentic", adding that: "The books composed about this subject are more numerous and greater than can be estimated, because the authors make false claims about them…It is Allah who knows."

In 1144, Jabir's *Book of the Composition of Alchemy* was translated into Latin, sparking off a European obsession. Although scores of books were attributed simply to 'Al Sufi' in the Middle Ages, when Richard Russell translated the *Sun of Perfection* in 1678, he referred to him as 'Geber, the most famous Arabian Prince and Philosopher'.

While Jabir's works demonstrated an unparalleled level of experimentation and comprehension, his *Book of Stones* was written in deeply esoteric code, decipherable only to the initiates of his alchemy school. The seemingly nonsensical writings went on to inspire the term 'gibberish'.



Although thousands of books have been attributed to Jabir, or Geber in Latin, many of them were penned by his students and followers dioxide in glass-making and identifying paints and greases. He was the first person to produce both crude sulfuric and nitrate acid, mixing the two to produce aqua regia – which he used to dissolve gold and silver.

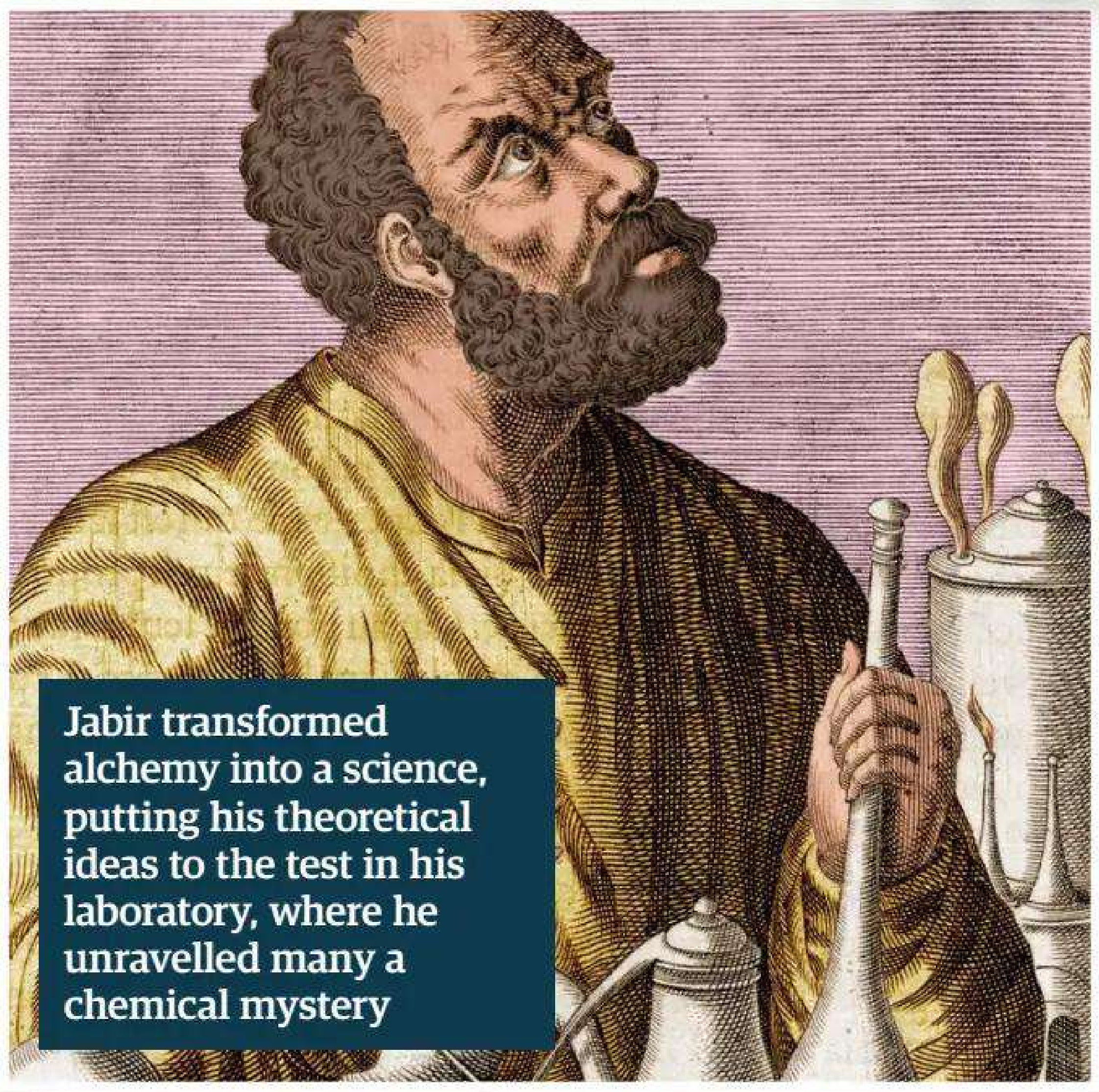
As a man with a broad understanding of philosophy, medicine, mysticism and alchemy, he was impossible to dismiss. However, his prolific exploration of the dark arts placed Jabir in great danger. Subjected to persecution "from the hands of envious and evilly disposed people", he narrowly escaped death on many occasions, according to Al Jildaki. By the same token, his brilliance earned him the attention of the Barmakids and, after curing one of Yahya's valuable slaves with an elixir of his own invention, their trust. With their patronage, he was able not only to pursue his passions in the open, but rise to the position of court alchemist, even serving as a physician to Yahya's sons. Suddenly, as the Islamic world developed its own academic traditions, Arabic became the language of science – 'al-kīmiyā' would later become 'alchemy', and then 'chemistry'.

Among Jabir's most spectacular theories was the Theory of Balances, a divine science devoted to understanding every object and process in the universe. Continuing this, the Balance of Letters comprised a metaphysical and methodological system, relating the four natures – heat, coldness, humidity and dryness – to phonetics, morphology, prosody and musical harmony.

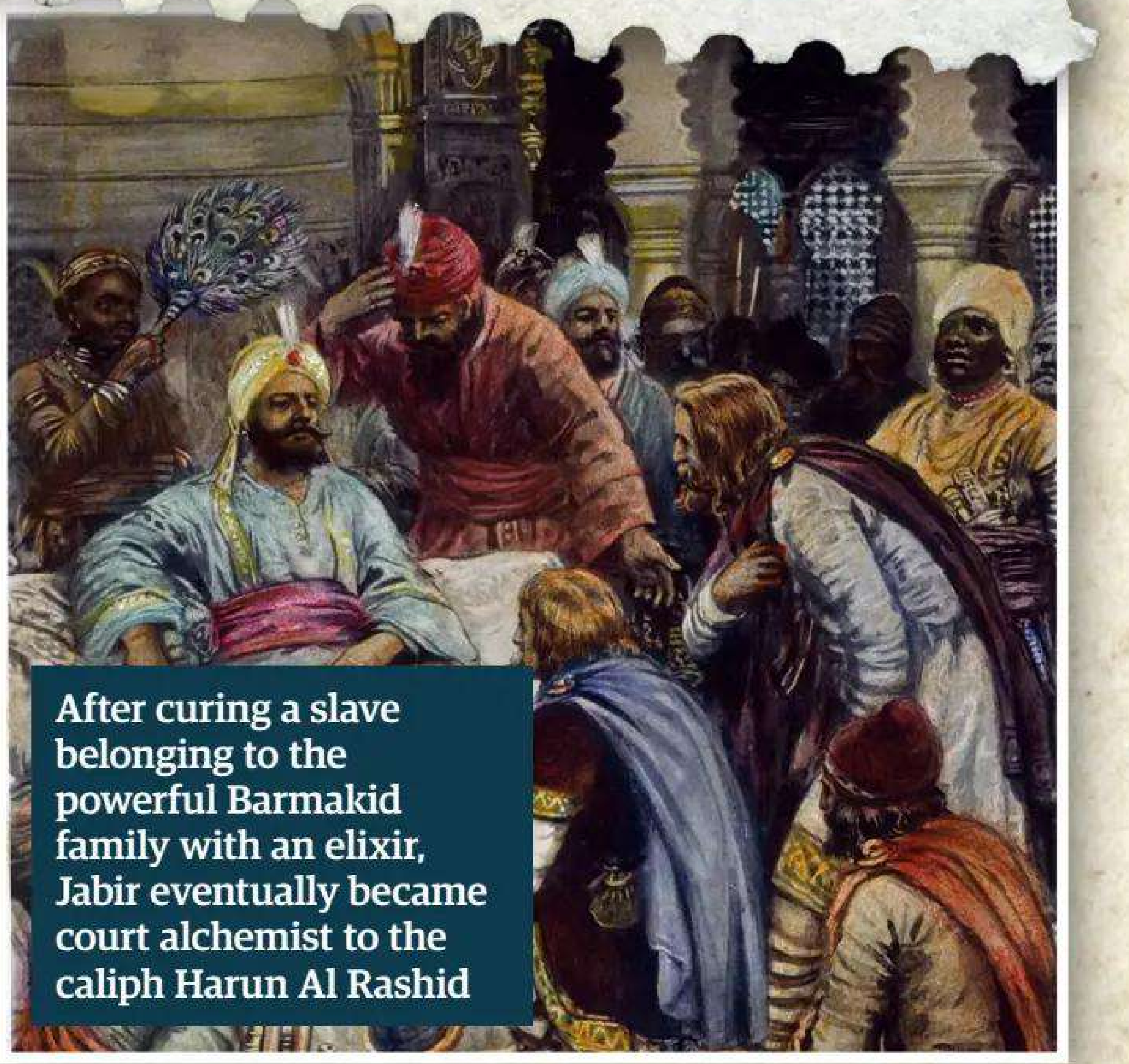
Unfortunately, in 803, with tentacles now stretching across the Caliphate, the Barmakids fell out of favour with Harun Al Rashid – perhaps having grown too influential for their own good. The caliph spontaneously stripped the dynasty of its positions and wealth, locked up Yahya and executed his son Jafar. With his fate inextricably linked to that of his patrons, Jabir fled back to his father's home in Kufa, where he spent the rest of his days conducting experiments in his home laboratory, before dying in 815 – supposedly at the ripe old age of 95. Jabir's work would go on to play a crucial role in European chemistry of the Middle Ages. Several of his books were translated into Latin, remaining popular for hundreds of years. Two centuries after his death, during the demolition of Baghdad's Bab Al Sham quarter, a mortar was discovered in his laboratory, containing 200 pounds of gold.

With thousands of books attributed to his name, Jabir's practical and philosophical influence on science is unparalleled. It is a fitting legacy for a man who wrote: "The first essential in chemistry is that thou shouldst perform practical work and conduct experiments. For he who performs not practical work nor makes experiments will never attain to the least degree of mastery. But thou, O my son, do thou experiment so that thou mayst acquire knowledge."

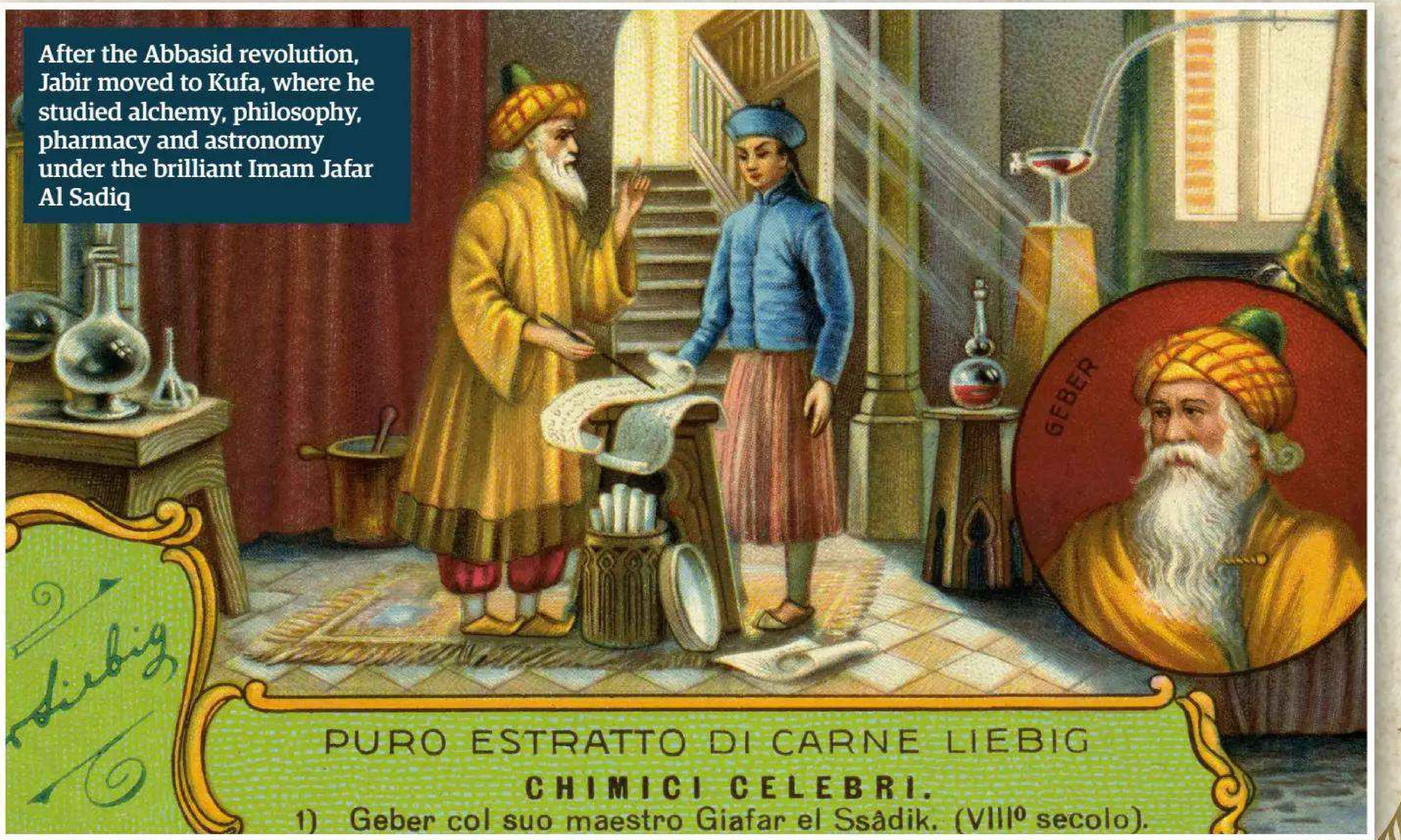
Jabir spent much of his life travelling from place to place, spreading his knowledge – hence his place on Syrian stamps



Jabir transformed alchemy into a science, putting his theoretical ideas to the test in his laboratory, where he unravelled many a chemical mystery



After curing a slave belonging to the powerful Barmakid family with an elixir, Jabir eventually became court alchemist to the caliph Harun Al Rashid


GEBER
Liebig
PURO ESTRATTO DI CARNE LIEBIG
CHIMICI CELEBRI.
1) Geber col suo maestro Giafar el Ssâdik. (VIII° secolo).

After the Abbasid revolution, Jabir moved to Kufa, where he studied alchemy, philosophy, pharmacy and astronomy under the brilliant Imam Jafar Al Sadiq

RHAZES

Not as well-known as the doctors and physicians of antiquity, Rhazes' advancements were pivotal during the Golden Age of Islam

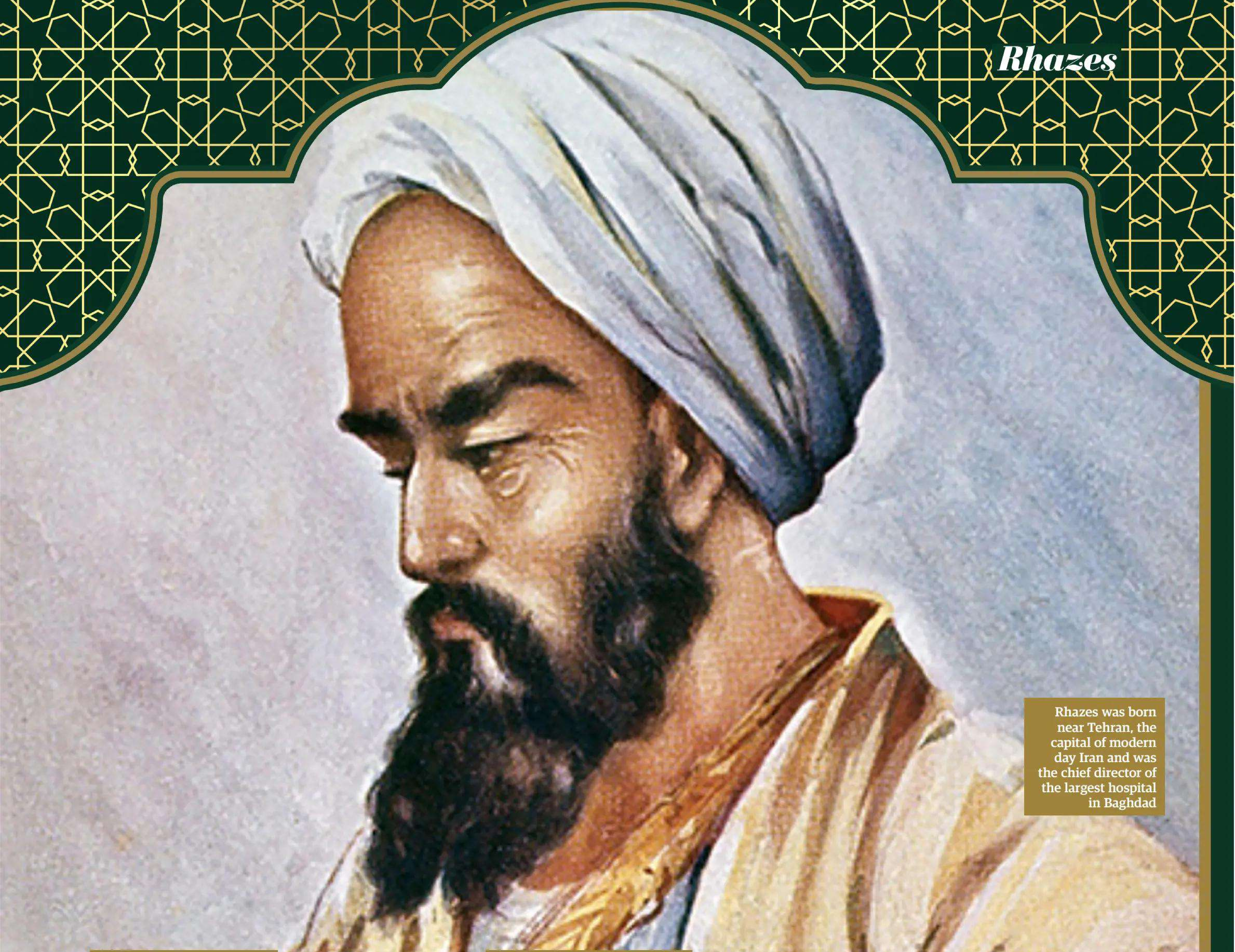
Words Jack Griffiths

One of the most significant and important physicians during the Golden Age of Islam was Rhazes. Born in 865 CE and known as Al-Razi in the Islamic world, his ideas, techniques and practices helped advance medicine and healthcare. The young Rhazes was talented in many fields including philosophy, music, maths and science. It was medicine, however, that he would be forever remembered for. He was influenced by Galen, Socrates and Plato and was initially a director at a hospital in his hometown of Rey in Persia.

At the hospital, Rhazes attempted to make care and treatment free of charge if possible and, like another one of his influences, Hippocrates, instilled optimism in his colleagues to best serve the needs of all patients. He worked to the Hippocratic Oath to give each person the best chance of recovery. He was mindful of the effect of supplying too many drugs in the treatment of patients and focused on how a positive state of mind was vital to recovery. Upon discharge, each patient was given both funds and aftercare treatment. Rhazes put an emphasis on the mental health, as well as the physical health, of patients. Physical and mental health wards were separated to makes sure different areas of the hospital serviced different needs. He would often be accompanied by students, as he went from ward to ward, eager to learn their craft from him. His successes didn't go unnoticed and he was personally selected by the governer of Rey to lead a hospital before leaving to take up the post of chief director at the al-Mutatid hospital in Baghdad.

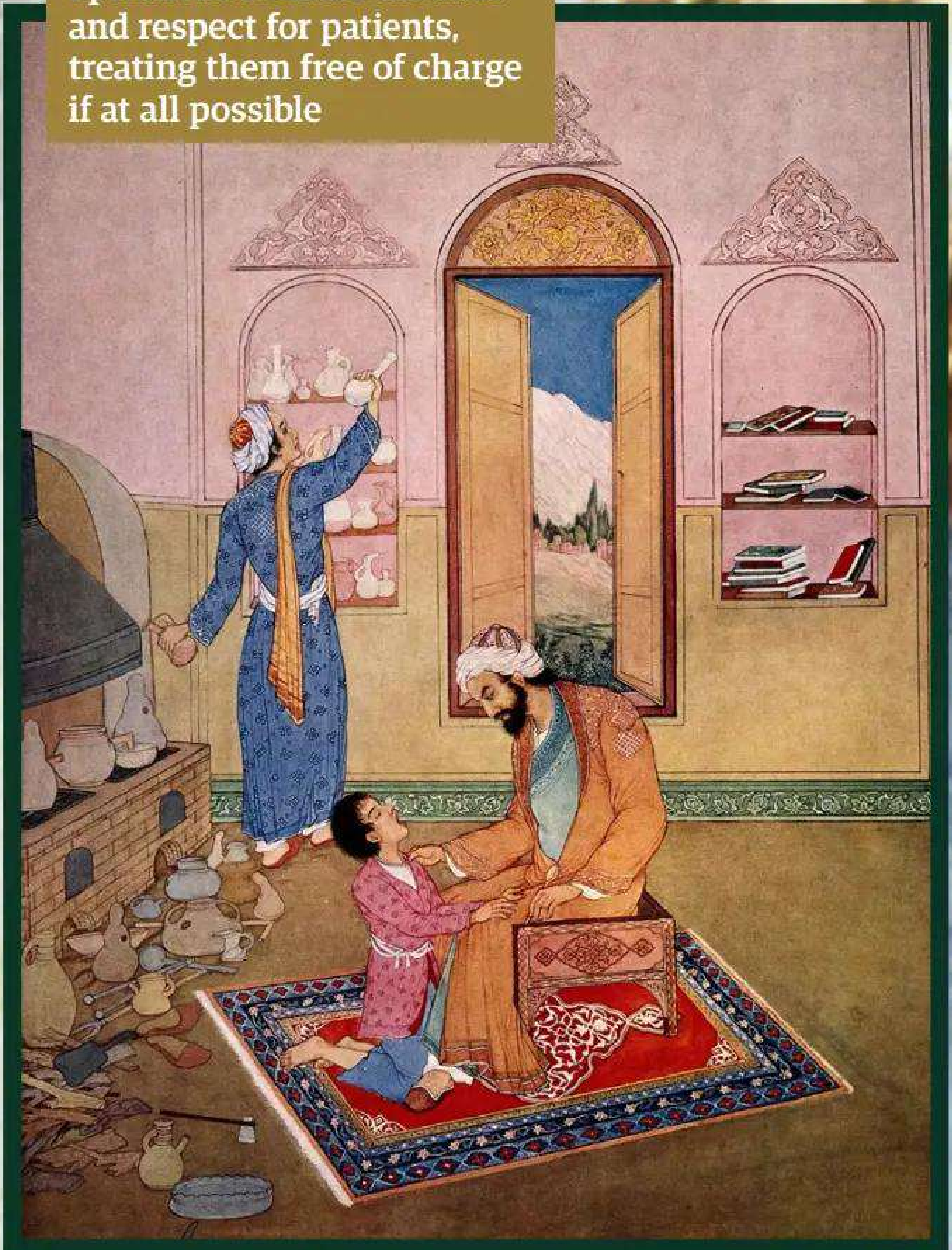
Away from the wards, Rhazes wrote various books including a medical encyclopaedia that would be exported into Europe. His research included work on the nervous system which developed the understanding of concussion and how it differed from other injuries and how wounds in different areas of the body could differ in severity. Rhazes was also known for increasing knowledge of specific diseases, understanding the difference between smallpox and measles and the early ideas of how immunity could be gained by those that had already acquired diseases.

He died at the age of 60 in 925 CE. Cataracts had developed in his eyes and he was blind by the time of his death. His ideas and methods weren't initially recognised internationally, but his importance to the development of medicine was later appreciated.

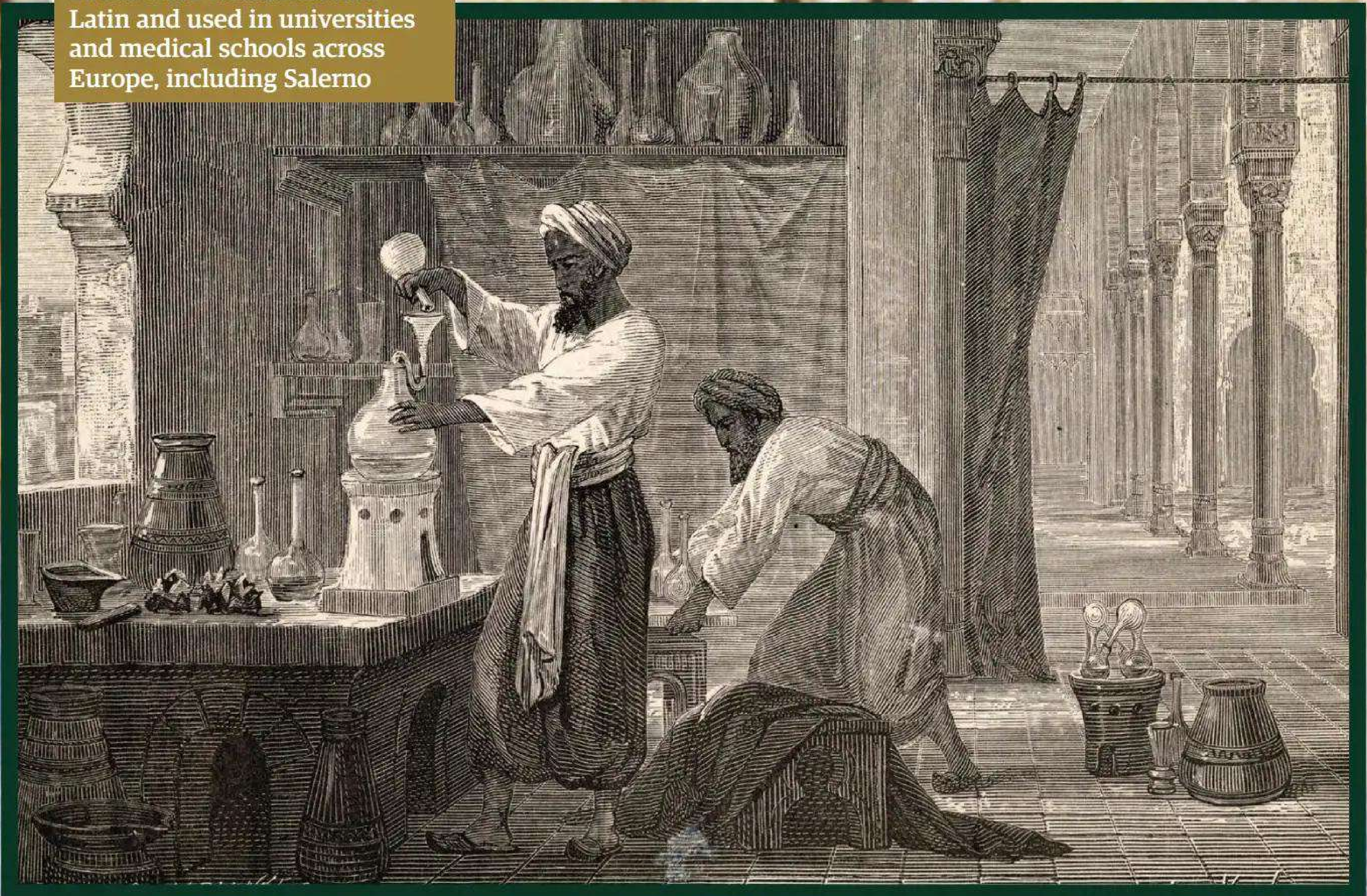


Rhazes was born near Tehran, the capital of modern day Iran and was the chief director of the largest hospital in Baghdad

Rhazes was known for his optimistic bedside manner and respect for patients, treating them free of charge if at all possible



More than 200 of Rhazes' books were translated into Latin and used in universities and medical schools across Europe, including Salerno



THE MAN WHO KNEW EVERYTHING

IBN SINA

Philosopher, mathematician, doctor, astronomer, poet: Ibn Sina was all of these things and more, the last man to master all the fields of human knowledge

Words Edoardo Albert

In his final week, Ibn Sina said: "I prefer a short life with width to a narrow one with length." The Persian polymath died aged 57 but during those years he was a doctor, philosopher, mathematician, grammarian, astronomer, politician, poet and traveller. Ibn Sina lived a tumultuous life full of intrigues, daring escapes, great power and dramatic falls - all the time working on the deepest problems of philosophy while still engaging in a notorious social life and indulging a voracious sexual appetite. Lying on his death bed, Ibn Sina could look back and see that he had lived life on his own terms.

He was born in August 980 in a village near Bukhara, Central Asia, to an important local family and spent his childhood and youth in the city. Bukhara was a major staging post on the Silk Road and a graceful and prosperous city that attracted peddlers of knowledge as well as sellers of wares. The young Ibn Sina was intellectually precocious and his father employed the best tutor he could find to educate his son. But Ibn Sina soon outstripped the learning of his tutor. Never one to undersell himself, he remarks in his autobiography that he soon began to teach his teacher.

At the end of the first millennium there was considerable ferment in the Islamic world and Ibn Sina's father and brother became known as Ismailis, followers of an Islamic sect that drew bitter repression from orthodox Sunni Muslims. Although Ibn Sina remained reticent about his own religious beliefs, his family association would greatly affect his later life.

By his mid-teens, he had mastered jurisprudence, the key scholarly field that allowed an Islamic intellectual freedom of movement around the Islamic world, but he decided to add another string to his intellectual arsenal when he was 16: he would become a doctor. It did not take long. He declared: "Medicine is not a difficult science, and naturally I excelled in it in a very short time, so that qualified physicians began to read medicine with me."

Never short of confidence, the young prodigy was called in to help with the care of the amir of Bukhara and promptly cured him when the amir's own, much more experienced doctors, were unable

الواحد النور العلي
وخلق
البصر
الأخبار
ارجوزة
بالقول
السلاق
الشعر

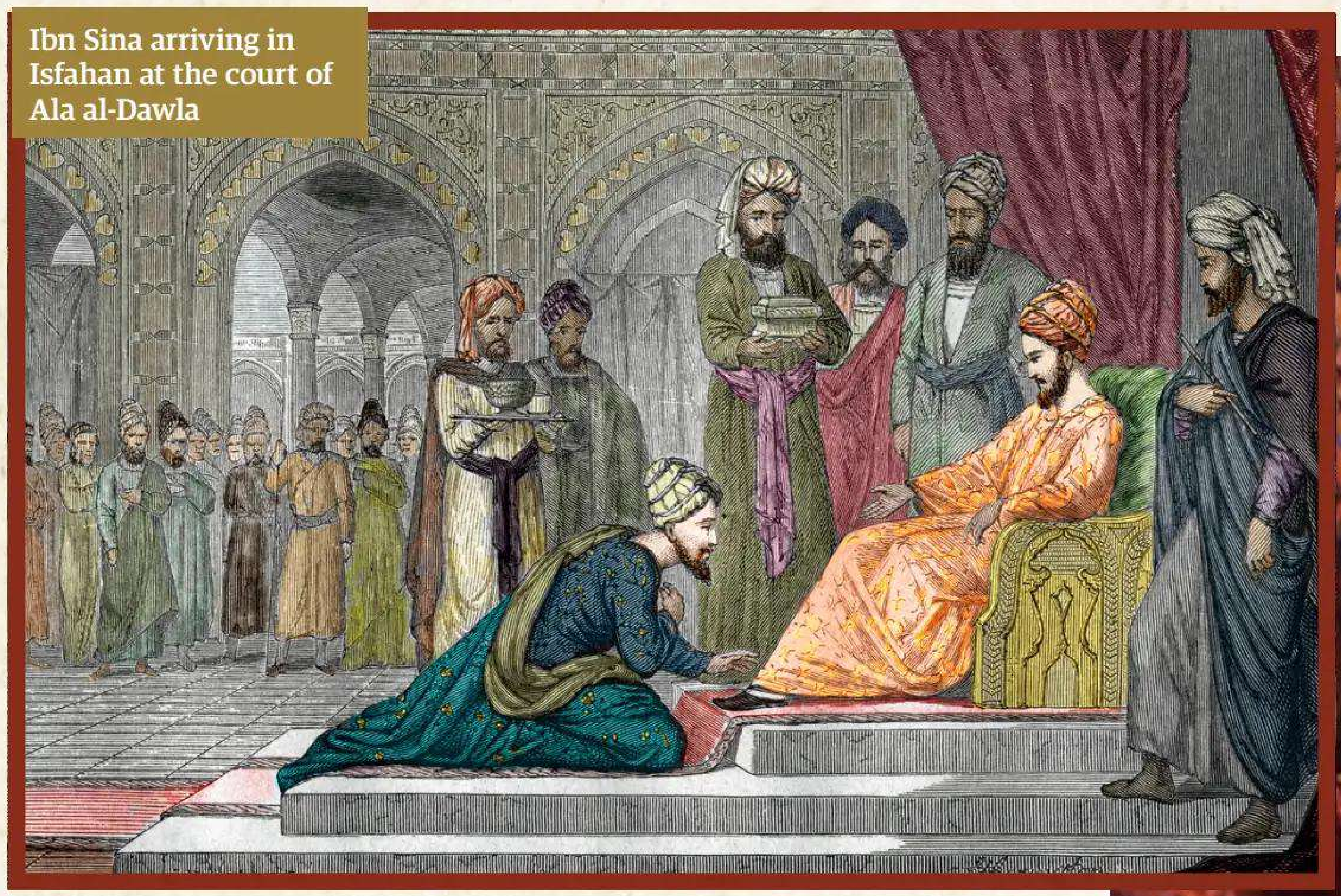
> “IBN SINA BURIED HIMSELF IN LEARNING, MASTERING EVERYTHING HE READ AND COMMITTING IT TO MEMORY”

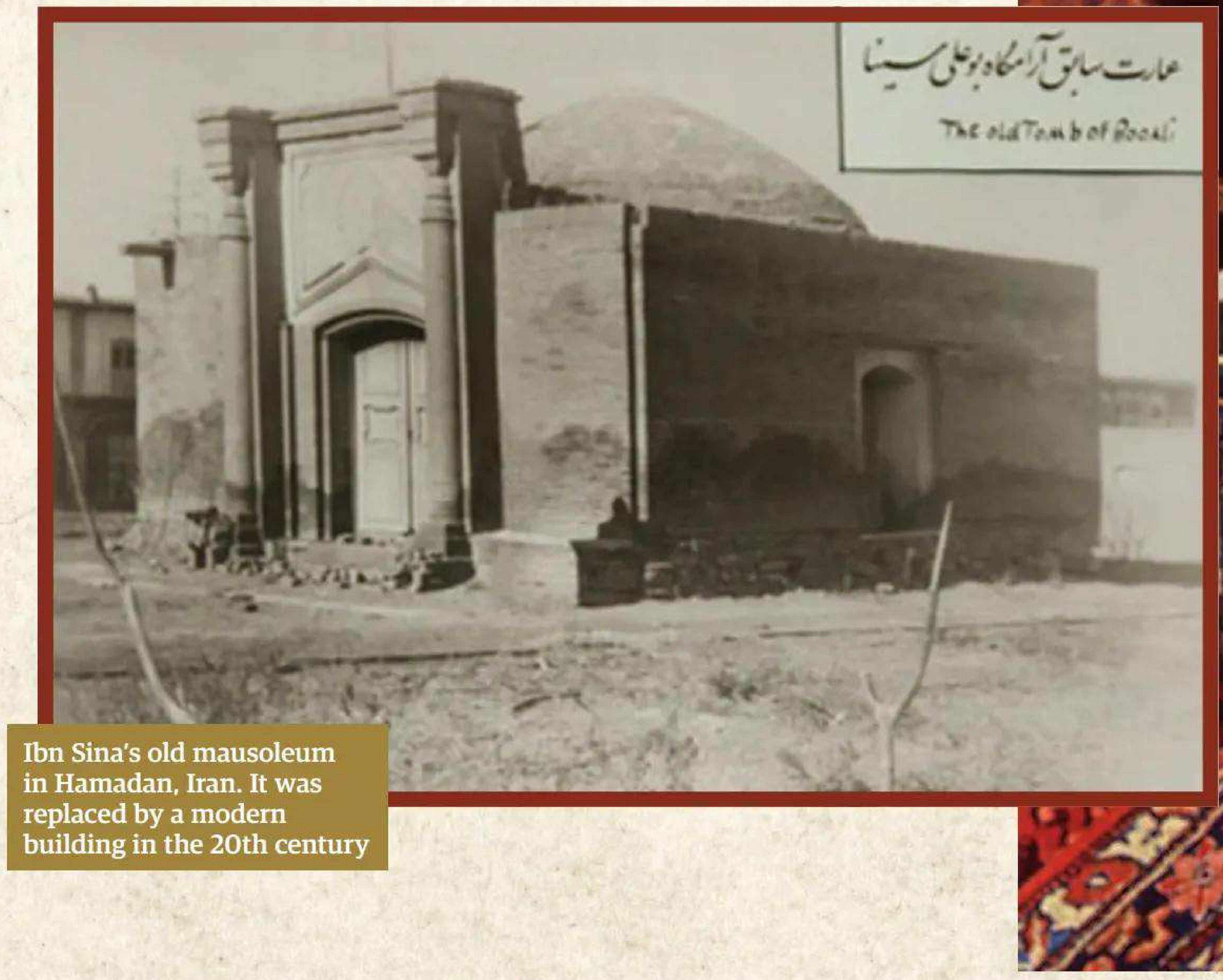
to. The grateful amir offered Ibn Sina gold and jewels but the young man chose instead to have unrestricted access to the amir's personal library, which was said to contain as many volumes as the great library of Baghdad. Ibn Sina buried himself in learning, mastering everything he read and committing it to memory. Books were valuable and rare, but his prodigious memory allowed him to carry the knowledge he found in books with him wherever he wandered. And he soon had to leave Bukhara.

The amir died and warlords began to squabble over Bukhara. In such a volatile situation, Ibn Sina took to the road. He first travelled to Gurganj (Konye-Urgench in modern-day Turkmenistan), where he spent ten years and entered into a long and increasingly irritable correspondence with another polymath of the Islamic world, Al-Biruni. When Al-Biruni persisted in not agreeing with him, Ibn Sina delegated the job of answering Al-Biruni's objections to one of his students.

Ibn Sina would probably have remained in Gurganj if not for the man whose shadow would loom over the rest of his life. The warlord who had emerged as the dominant power in central Asia, Mahmud of Ghazna, was set on forging a new Ghaznavid empire and to bolster his legitimacy and burnish his regime he was keen to bring to his court the most brilliant Islamic scholars. But Mahmud was resolutely Sunni and fiercely intolerant of unorthodoxy. Life in his court would be intolerable for a man like Ibn Sina, who acknowledged no primacy over intellectual inquiry and whose social life tended to the unorthodox – he loved the company of musicians and poets, and used wine to help unlock difficult intellectual problems. Learning of Ibn Sina's reputation, Mahmud of Ghazna ‘requested’ the amir of Gurganj send this brilliant, and by all accounts extraordinarily handsome, scholar to adorn his court in Ghazna.

The amir of Gurganj could not ignore Mahmud's request but he did warn Ibn Sina, giving him the option to escape before Mahmud's soldiers arrived to escort him to Ghazna. In 1012, Ibn Sina fled Gurganj, accompanied by another refugee from


Ibn Sina arriving in Isfahan at the court of Ala al-Dawla



Ibn Sina's old mausoleum in Hamadan, Iran. It was replaced by a modern building in the 20th century

Mahmud, a Christian artist named Abu Sahl. Hearing that Ibn Sina had absconded, Mahmud ordered a portrait to be drawn of Ibn Sina which was then copied and distributed throughout his realm. Ibn Sina and Abu Sahl were hunted men. Caught in the open by a sandstorm, they could do nothing but shelter under their cloaks. When the storm passed, Abu Sahl was dead.

The ailing Ibn Sina made it to Jurjanj (Gurgan in today's Iran) where he met a young man, Al-Juzjani, who would become his companion, biographer and all-round champion. Ibn Sina cured the amir of the nearby city, Ray, of his melancholy, and the amir of Hamadan, Shams al-Dawla, of a bowel disease. In gratitude Shams al-Dawla made Ibn Sina his vizier - his prime minister. Ibn Sina lived from 1015 to 1024 in and around Hamadan, his duties as vizier occasioning frequent travel. He made use of the travel time by dictating his latest work to his amanuensis, Al-Juzjani, as they rode. *The Canon of Medicine*, which would be the primary textbook for doctors for 500 years, was largely composed while riding from one town to the next, its contents drawn directly from Ibn Sina's prodigious memory.

Ibn Sina (or Avicenna as his name was rendered into Latin) remains a significant figure in history, commemorated in stamps by many countries

In 1021, Ibn Sina's patron and protector, Shams al-Dawla, passed away and his son, Sama al-Dawla, became amir. The new ruler asked Ibn Sina to stay on as vizier but he was wary of Sama's intentions and secretly wrote to the ruler of Isfahan, Ala al-Dawla, offering him his services. Unfortunately for Ibn Sina, his correspondence with a rival ruler was leaked to Sama and the enraged amir promptly imprisoned his vizier while Ala and Sama settled their differences on the battlefield. Defeated, Sama took refuge in the same castle where he had imprisoned Ibn Sina. The victorious Ala al-Dawla withdrew to Isfahan and Sama al-Dawla cautiously emerged from his bolthole, taking Ibn Sina with him and offering him all sorts of blandishments to become his vizier once again. But Ibn Sina had made up his mind. In the last of the daring escapes that marked his life, he fled Hamadan disguised as a Sufi with the faithful Al-Juzjani, his brother Mahmud and two slaves accompanying him.

The group of escapees made it to Isfahan, where Ala al-Dawla greeted Ibn Sina with genuine delight. It was a meeting of minds and Ibn Sina spent the rest of his life in the company and service of the amir of Isfahan. At the previous courts where Ibn Sina had found employment, there was always the sense that the great scholar was looking after himself and that if the going for his patron got tough he would head for the exit. But this was not the case with Ala al-Dawla. Ibn Sina served him faithfully through all the amir's vicissitudes. For five years in Isfahan, Ibn Sina had intellectual freedom and the support of an amir personally interested in the pursuit of knowledge. But then, in 1029, his old nemesis, Mahmud of Ghazna, moved against Isfahan, sending his son, Masud, to conquer the city. Ibn Sina fled with Ala al-Dawla and Masud took Isfahan, only for the news to reach him of his father's death. Masud promptly rushed back to Ghazna to claim the throne from his brothers, killing anyone who got in the way, and Ala al-Dawla took the chance to reclaim his city. But having removed his fraternal rivals, Masud marched on Isfahan again. Over the next few years, Masud repeatedly conquered Isfahan and Ala al-Dawla repeatedly took it back whenever Masud had to deal with other problems in his sprawling kingdom.

It was during one of the final withdrawals from Isfahan, with Masud's army rapidly approaching, that Ibn Sina fell ill. If he was to avoid capture, Ibn Sina knew he had to get himself fit enough to travel. But he overprescribed, causing a suppurating wound that was exacerbated by Ibn Sina's insistence on continuing regular sexual intercourse with his concubines. Thus weakened, the greatest doctor of the age died during Ramadan in 1037. Lucid to the end, Ibn Sina realised his death was near, telling Al-Juzjani: "The governor that used to rule my body is too weak to rule any longer. Treatment is of no further use."

While he was fluent in many different languages, Ibn Sina was happiest in the Persian milieu

Dealing with different head wounds according to Rogerius

Some of the illustrations from Rogerius' *Practica Chirurgiae*. It's not apparent how Rogerius kept his patients still during these procedures

THE FIRST SURGEON

How a Finn moved to Italy and revolutionised the practice of surgery

Words Edoardo Albert

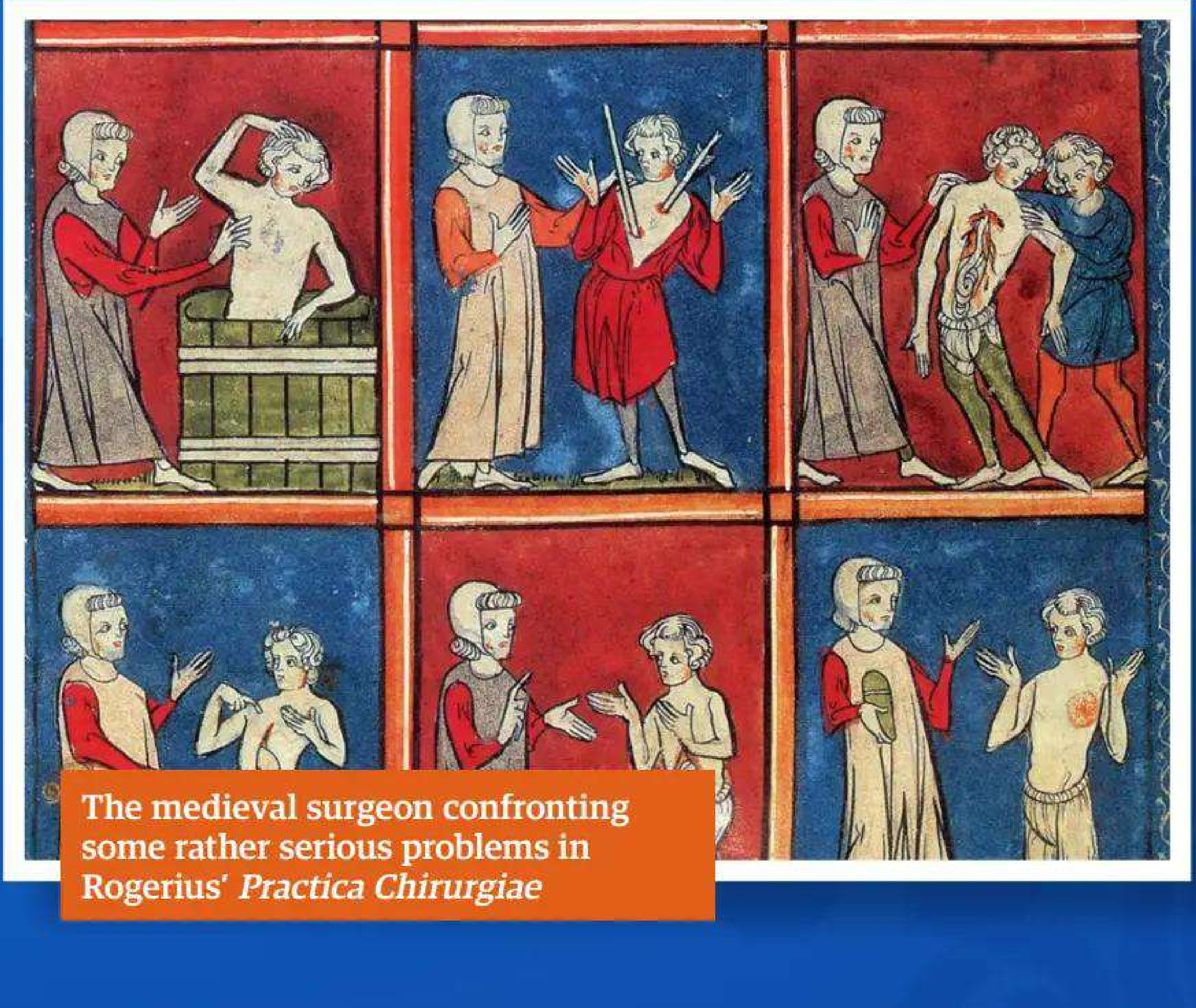
Unlike today, when surgeons sit at the top of the medical tree, in the Middle Ages they ranked well below physicians in terms of prestige and pay. This was because surgery was regarded as a practical skill which was learned through an apprenticeship to a practising surgeon rather than something the student learned through study. Physicians studied for years at the new European universities and, not surprisingly, they were not keen to relinquish their status to a group of blood-stained barbers.

The man who began the process of change was named Roger and although he was often called Rogerius Salertinanus, that is Roger from the school of medicine at Salerno, he was originally from Finland, being born there before 1140. Roger moved with his family to Italy, studied medicine and became a well-known surgeon at the school of medicine in Parma.

Roger wrote a book, published in 1180, called *Practica Chirurgiae* (Practical Surgery). It was the first European textbook of surgery. What set it apart was that Roger based it on his own practical surgical experience rather than recycling the dubious techniques of the classical world. Roger structured the book according to body areas: the head; neck and throat; chest and stomach; and the limbs. Most of the chapters deal with surgery after trauma and they reveal Roger's hard-won practical experience. For instance, in the chapter on the head, Roger wrote that the surgeon should put his fingers into the wound as touch was the best way to tell if the skull had been fractured.

Indeed, so far ahead of his time was Roger that his description of how to perform a thyroidectomy to treat goitre was only replicated 700 years later. However, there were limits to what Roger could accomplish as a surgeon, limits that he himself recognised and passed on to his readers, advising them to refuse to perform surgeries on the heart, lungs, liver or stomach as the possibility of death was too high and then the blame would attach to the surgeon. Roger also recommended explaining to the patient the possible consequences of an operation, bad as well as good, so that the patient could give informed consent to the procedure while protecting the surgeon from later claims of malpractice.

Roger's *Practica Chirurgiae* was carefully illustrated and Roger's pupil, Roland, revised and updated the work, adding new techniques that he had discovered after his master's death. As such, it became the source book for European surgeons, paving the way towards the recognition that surgery was as much a part of medicine as the physician's diagnosis.



The medieval surgeon confronting some rather serious problems in Rogerius' *Practica Chirurgiae*

ARNALDUS DE VILLA NOVA

Physician, translator and sometime superstar heretic, the exceptionally well-connected Arnaldus de Villa Nova was a groundbreaking figure in medieval medicine

Words Catherine Curzon

Where and precisely when Arnaldus de Villa Nova was born has been lost to history, but his remarkable achievements have survived his death in around 1311; centuries later, he is remembered for the strides he made in Western medicine.

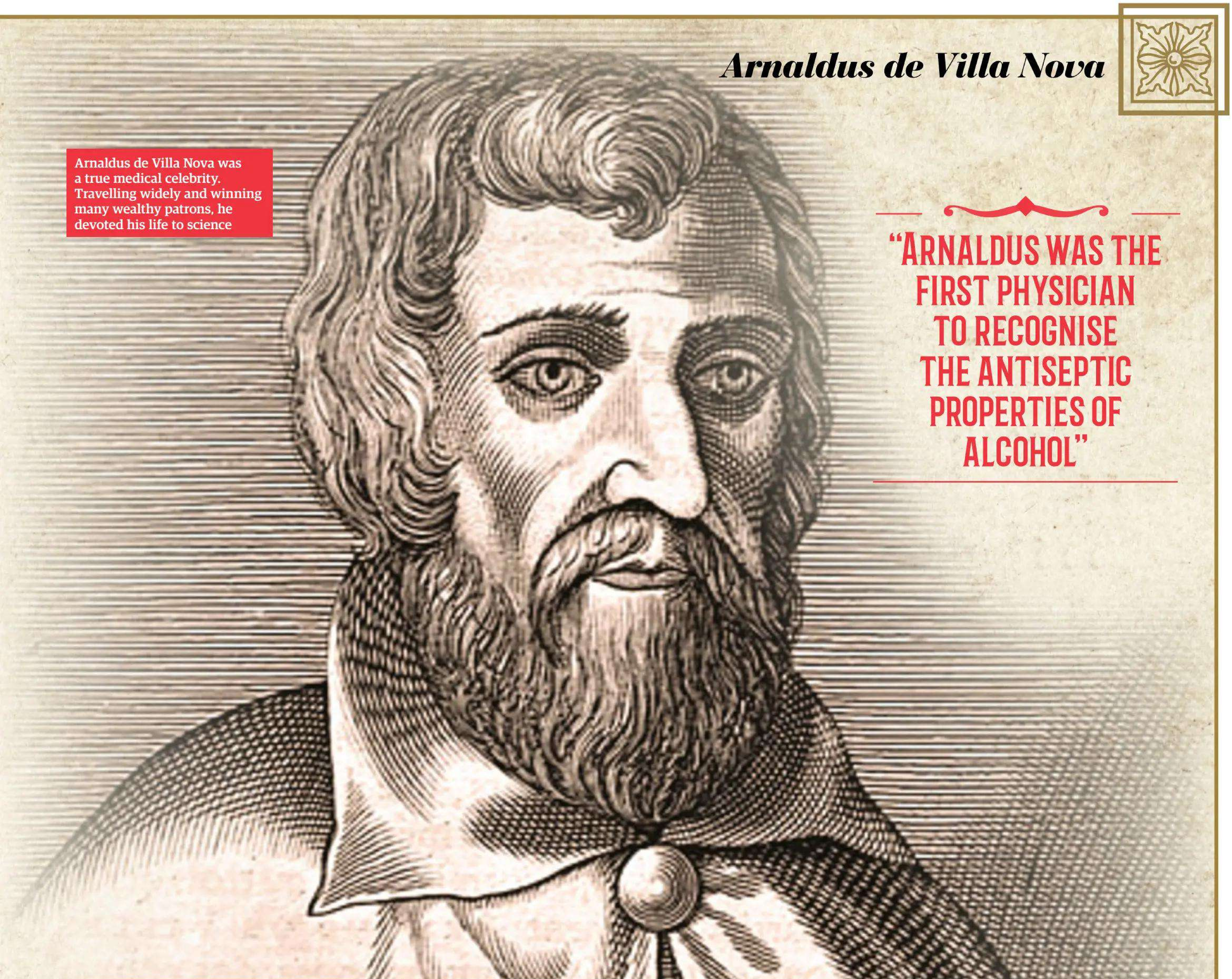
A born scholar who later became renowned for his knowledge of languages and science, Arnaldus studied medicine in Montpelier before undertaking a tour of Europe, where his reputation as a doctor soon went ahead of him. As his fame grew, the most illustrious patients flocked to employ his service and he became the personal physician of kings and popes, enjoying superstar status as a leader of his profession. Yet Arnaldus didn't enjoy unbridled hero worship; indeed, his meteoric success looked set to be curtailed when he was imprisoned after calling for church reform. Luckily, the well-connected Arnaldus was saved by Pope Boniface VIII, who was a loyal patron of his.

After a spell at the head of Paris' medical school and a second stay in prison for heresy, Arnaldus found time to serve as an ambassador for the court of Aragon and was spared the horrors of the Inquisition by his royal connections. In between annoying the religious establishment and tending his illustrious patients, Arnaldus found time to write around 100 medical works, and translated a number of important ancient medical texts into Latin. His work with Arabic medical writings brought a wealth of new texts to physicians and his perceptive commentaries on how Western and Eastern medicine could complement one another helped to forward medicine in Europe.

A keen winemaker, Arnaldus was the first physician to recognise the antiseptic properties of alcohol. He advocated its use not only as a restorative for patients but also as a valuable component in poultices and dressings, keeping a wound clean and free of infection. In doing so, Arnaldus truly broke new ground in hygiene and influenced medical practice for centuries.

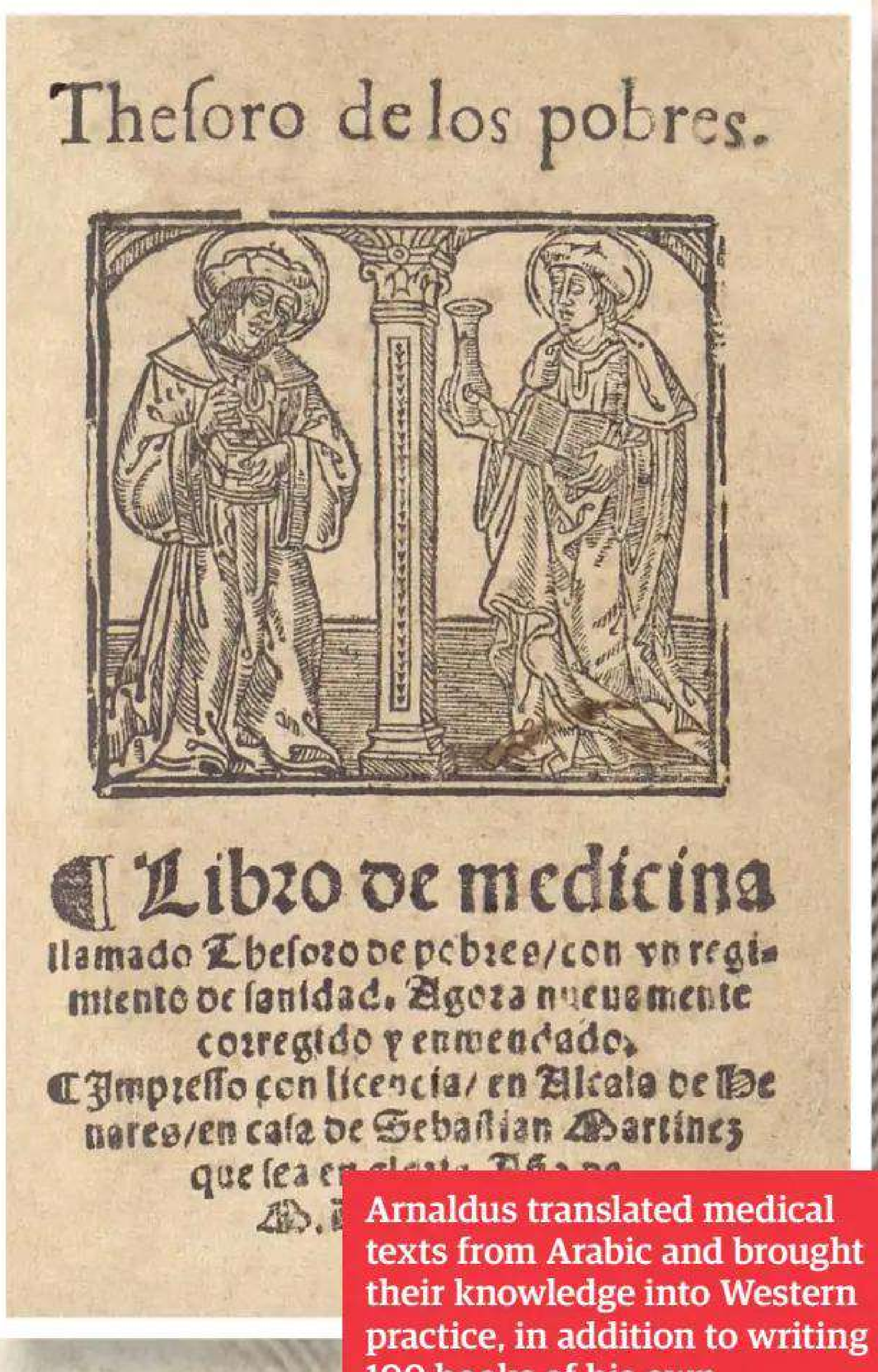
Arnaldus had a deep understanding of chemistry, botany and biology, but he also had an enduring interest in alchemy too. Many alchemical texts have been attributed to him though these have not been authenticated: in the era of the Inquisition, alchemical anonymity was vital.

After teaching and practicing across the continent, Arnaldus was summoned to Avignon in France by Pope Clement V. It was to be the last trip of Arnaldus de Villa Nova, who sadly died before his voyage could be completed.



Arnaldus de Villa Nova was a true medical celebrity. Travelling widely and winning many wealthy patrons, he devoted his life to science

> **"ARNALDUS WAS THE FIRST PHYSICIAN TO RECOGNISE THE ANTISEPTIC PROPERTIES OF ALCOHOL"**



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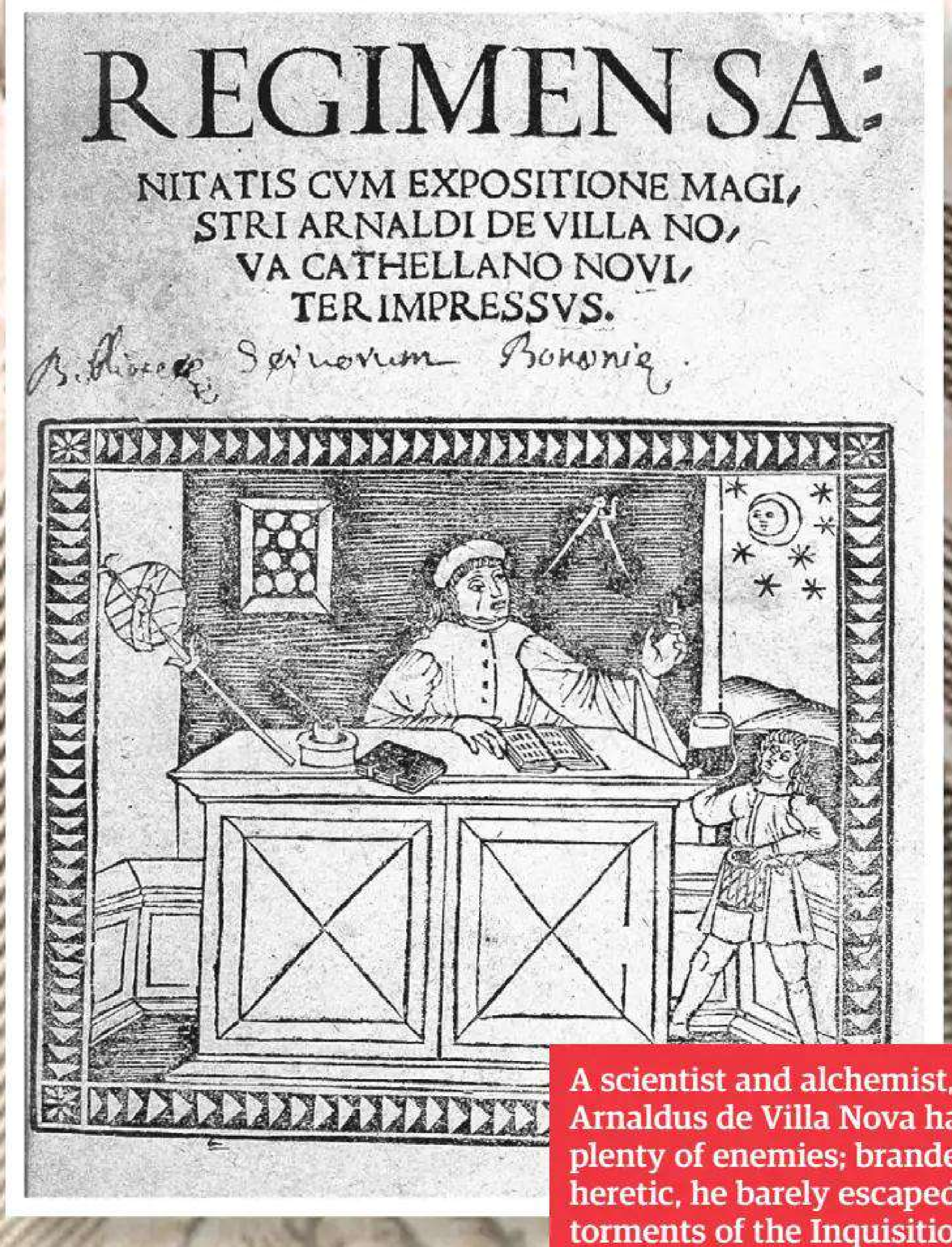
Arnaldus translated medical texts from Arabic and brought their knowledge into Western practice, in addition to writing 100 books of his own



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A scientist and alchemist, Arnaldus de Villa Nova had plenty of enemies; branded a heretic, he barely escaped the torments of the Inquisition

THE FIRST
MODERN DOCTOR

Friar, bishop, doctor, surgeon, Theodoric Borgognoni pioneered new surgical treatments and started the process of disentangling medicine from the chains of the ancients

Words Edoardo Albert

Theodoric Borgognoni was a medieval example of the adage that if you want something done, ask a busy person to do it. Theodoric was born in 1205 in Lucca, Italy. He went to the University of Bologna where he studied medicine while also entering the Dominicans, one of the new orders of friars that, alongside the Franciscans, was renewing and revolutionising medieval Christianity.

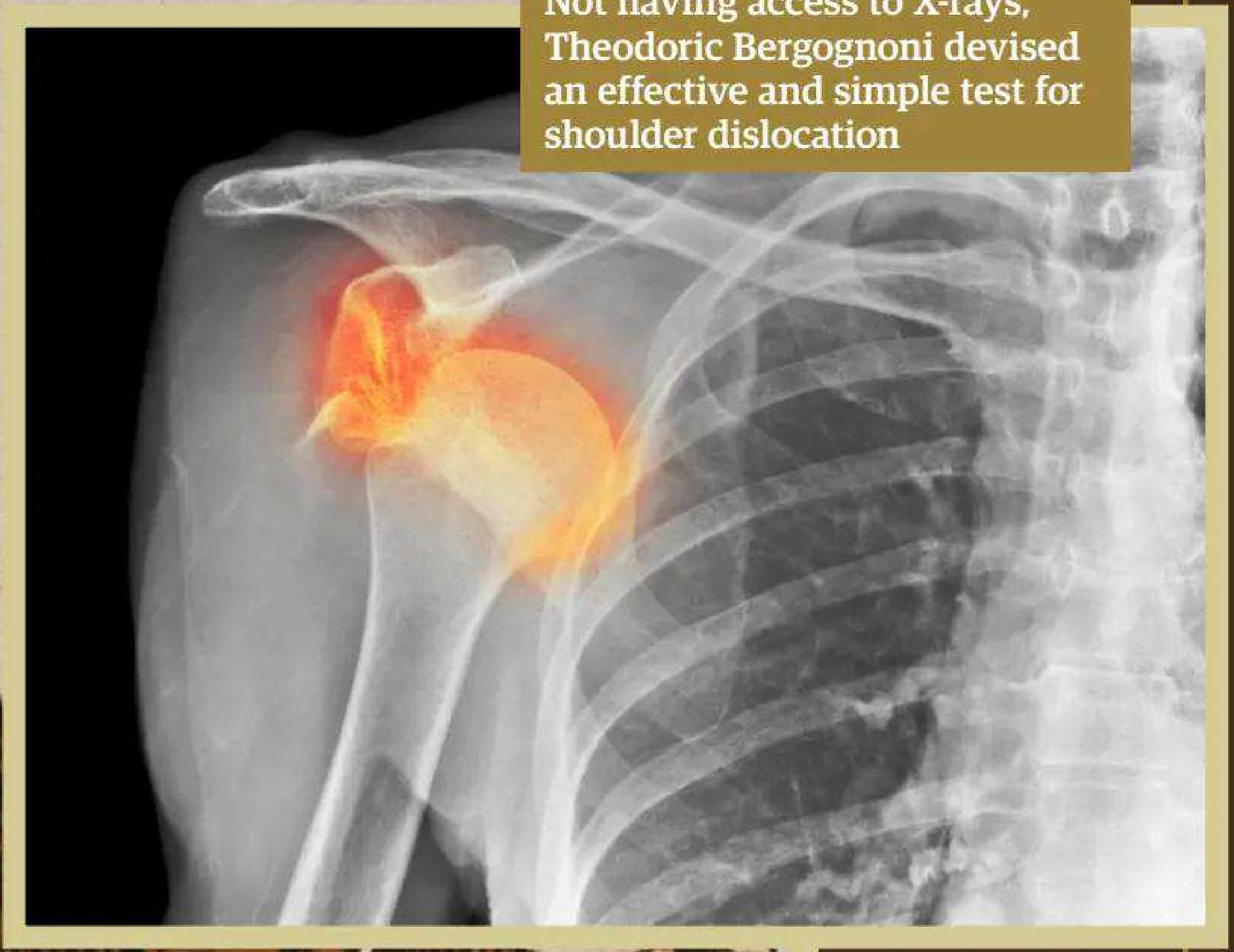
Such was his medical ability that Theodoric became the personal physician to Pope Innocent IV, while his pastoral abilities meant that he was appointed the bishop of Bitonto and then in 1266 of Cervia, where he remained until his death.

Alongside his episcopal duties, Theodoric practiced medicine, specialising in surgery. To convey his findings to the wider world, Theodoric wrote a four-volume work, *Cyrugia* (Surgery) that became hugely influential among later generations.

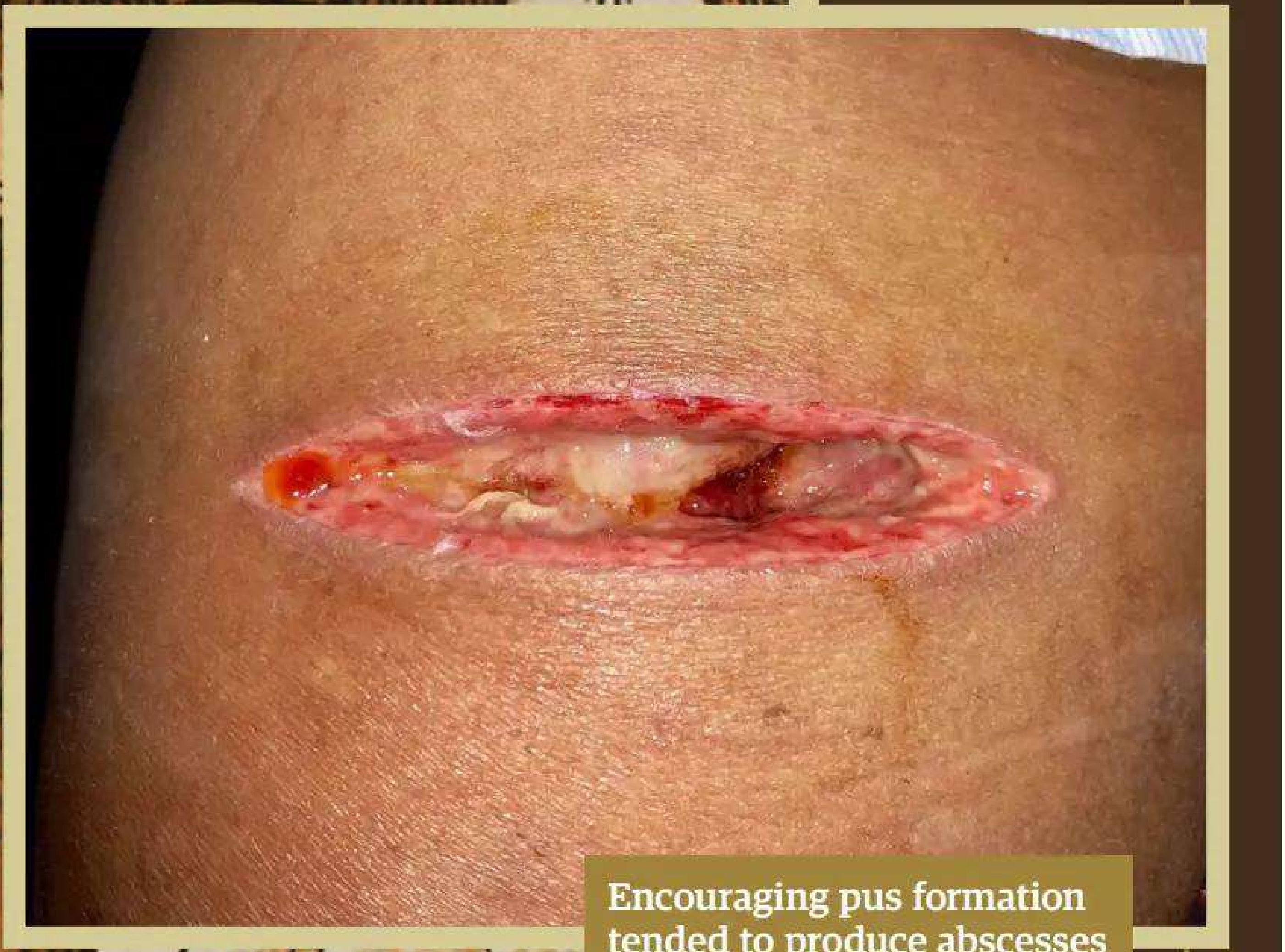
What separated Theodoric from most of his contemporaries was his insistence on the value of the surgeon's practical experience, as opposed to slavishly following the prescriptions of the doctors of the past. This was most apparent in what he wrote about pus forming in surgical wounds. According to Galen and Muslim medicine, this was something to be encouraged as aiding healing. Theodoric emphatically disagreed, saying that pus formation was dangerous to the patient. Theodoric wrote that surgeons should take an antiseptic approach to wound healing. The wound should be cleaned and stitched, then bandaged with cloth that had previously been soaked in wine to disinfect it. This was a major intellectual break with history, and part of European medicine's slow escape from the prison of the past.

Along with his advocacy of cleaning wounds, Theodoric also used an early form of anaesthetic to put his patients

The Dominican friars were established as an Order of Preachers and, as such, were more highly educated than other religious of the time



Not having access to X-rays, Theodoric Bergognoni devised an effective and simple test for shoulder dislocation



Encouraging pus formation tended to produce abscesses in surgical wounds

to sleep before performing surgery on them, using a sponge soaked in a mixture of opium, mandrake and hemlock to induce unconsciousness. The concoction was dangerous, but then, so was surgery without anaesthetic or pain relief.

Along with his work on surgery, Theodoric also developed a test for shoulder dislocation that is still used today: asking the patient to try to touch the opposite shoulder or ear. If that is not possible, then the shoulder is dislocated.

Theodoric Bergognoni's clear-eyed, practical, observational approach to medicine was the direct result of his training as a Dominican, a training that emphasised clear thought and rational analysis. In the universities, this produced the thought of fellow Dominican Thomas Aquinas. In medicine it produced Bergognoni's rejection of the slavish replication of the medicine of antiquity and for that we, the heirs of a tradition of free medical inquiry, must remain grateful.

HOW TO BE A SUCCESSFUL MEDIEVAL DOCTOR

John of Gaddesden's textbook of medicine became the basis of medical education for the next four centuries

Words Edoardo Albert

John of Gaddesden, an English physician of the 14th century, treated patients from the highest (Edward, the Black Prince) to the lowest, and became one of the best-known physicians of his age, while his medical book went on to become the basis of medical education for the next few centuries.

John wrote the *Rosa Medicinae* around 1313. By that time, he had taken holy orders so that he could study at Oxford University and had been accepted by his fellows there as a Master of the Arts. He named his book after the flower because, as the rose has five petals, his book had five parts and, displaying a marked sense of his own worth, because the rose is the best of flowers as his *Rosa Medicinae* was the best book about medicine. In the *Rosa*, John summarised the work of more than 46 medical writers of the past, including Galen and Avicenna, as well as including advice, treatments, drugs and medicines of his own devising.

That John was highly regarded by his contemporaries is indicated by the fact that, around 1330, he was employed as the personal physician to Edward, Prince of Wales (the Black Prince). During his employment, John treated and cured one of Edward's children of smallpox, ascribing the cure to wrapping the child all in red. While we might be dubious about this as an effective treatment, the Black Prince had no such qualms, giving John, in addition to his annual salary of £10, a rose made of gold.

Unusually for the time, John practised as both a physician and a surgeon, and did not mind telling others of the fact. So as well as diagnosing patients' illnesses, he also got his hands dirty doing the actual practical treatments of setting bones, drawing blood, pulling teeth and removing corns.

Among the practical advice for working physicians that John included in the *Rosa Medicinae* was the observation that, if they wanted to make a living from their profession, they should avoid treating patients with mental health problems as these illnesses seldom provided much in the way of fees for the doctor. He also advised his fellow doctors to adopt a sliding scale of charges and treatments, prescribing expensive remedies for the rich and cheaper ones for the poor.

John of Gaddesden died around 1348, his fame by that point such that Chaucer included him in his *Canterbury Tales* alongside Galen and Avicenna: high praise indeed at a time when the antiquity of a source was so highly valued. We don't know if John came from a rich or noble background but we do know that he operated on his own father, removing a 'stone' from beneath his father's tongue. Once recovered, his father must have been proud of the heights to which his son ascended.

John's most famous client was Edward, the Black Prince, victor at the Battle of Poitiers

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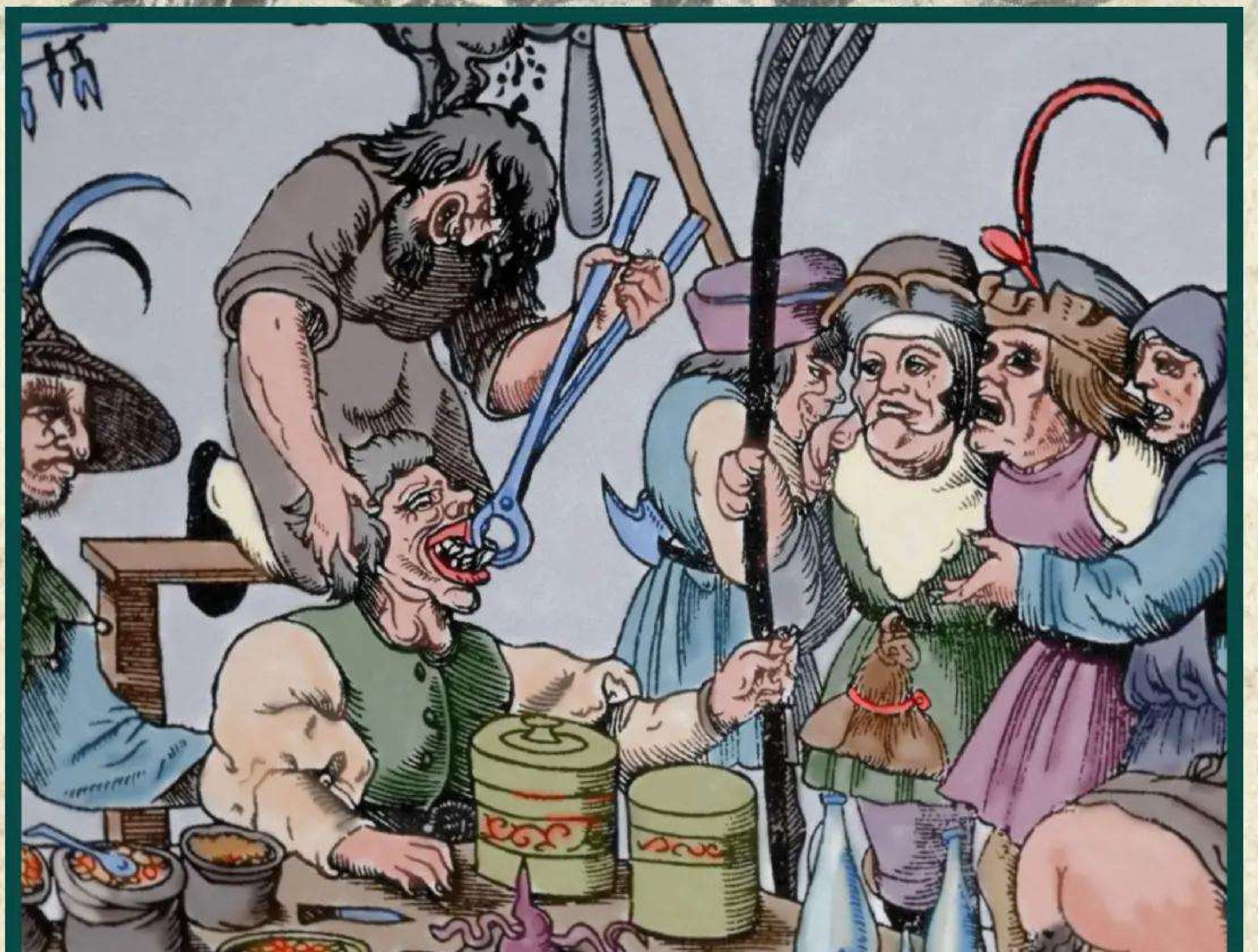
Such was John's fame that Chaucer wrote about him in the same context as Galen



Unusually for a medieval physician, John was happy to do the practical side of doctoring too, including extracting teeth

From healing the sick to writing crucial works on the nature of diseases, countless women played a vital role in medieval medicine

FEMALE PHYSICIANS OF THE MIDDLE AGES

Determined to make a difference despite the male dominance of the medical world, these pioneering women overcame numerous obstacles in their efforts to aid the infirm

Words Bee Ginger

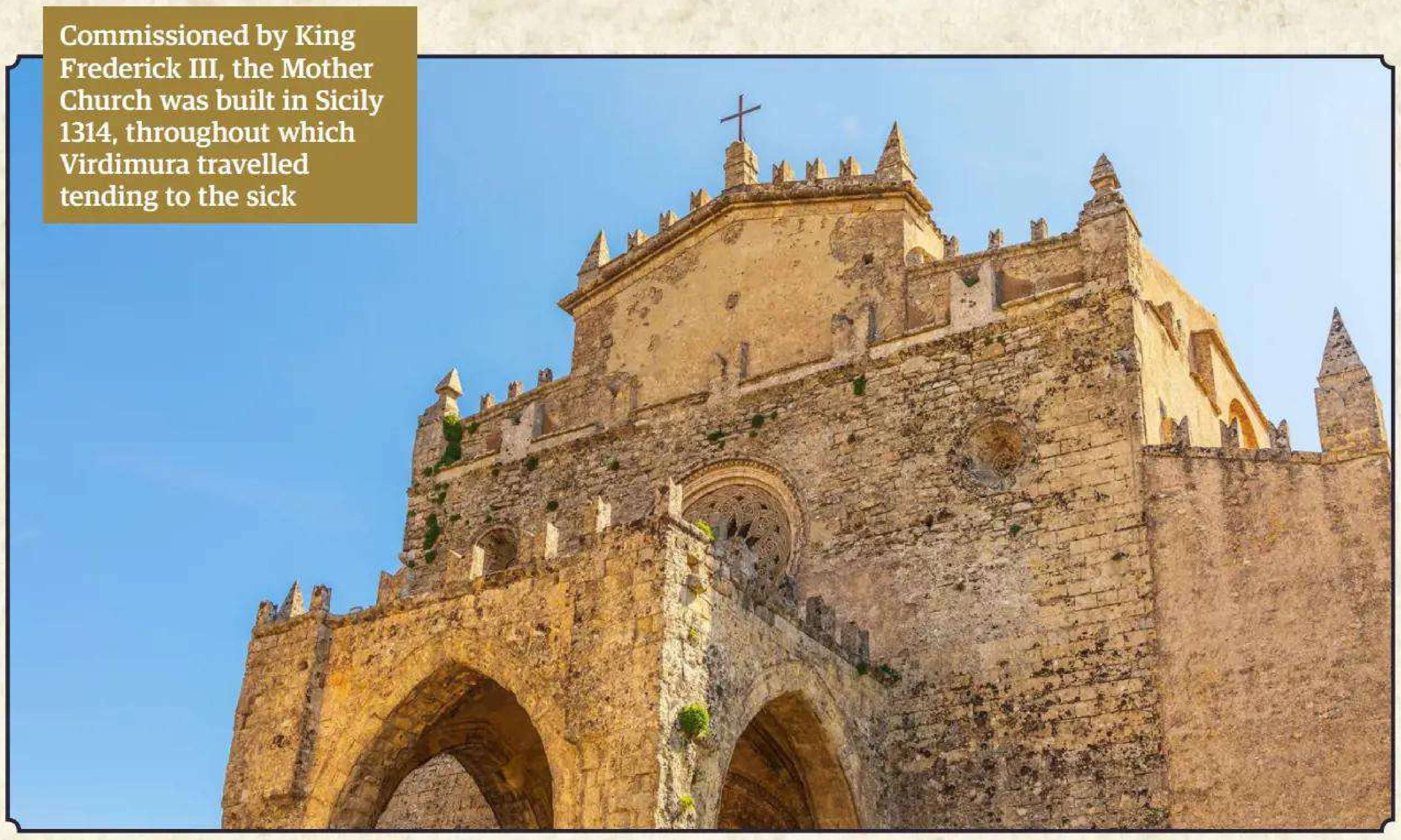
It's no secret that the medieval period was a man's world, an age when - with a few exceptions - kings wielded ultimate power backed by male counsel, educational opportunities for women were relatively rare, and the notion of females being more skilled surgeons and doctors than their male peers was considered ludicrous. Yet such a forbidding combination of factors did not prevent plenty of women from earning a reputation as excellent healers, even if they weren't officially physicians.

During this fascinating time the peasantry often relied on the wisdom of a 'wise woman'. These healers possessed expert knowledge of the powers of herbs and remedies, and they played an important role as midwives in an age when giving birth was often fatal.

Drawing on the land around them, wise women used a variety of ingredients (from plants to animal parts) to create ointments and other forms of medicine. These women would pass their expertise down to the next generation, thereby ensuring that their 'charms' or 'spells' (as their concoctions were often called, terms that would prove dangerous when healers began to be suspected and tried for witchcraft) survived. But they were not the only women who worked tirelessly to improve the lot of the masses - or their rulers. Throughout medieval Europe and the Arab world, women strived to enhance their understanding of the human body and establish safe, hygienic environments in which to treat patients, be they orphans, wounded warriors, or royalty. Interestingly, their efforts were met with very different societal reactions, with some receiving the appreciation of nobles while others were hauled before a court of law and tried for the crime of refusing to give up on people who had been discarded by frustrated male physicians unable to find a cure.

From the body-strewn battlefields of the Middle East to the towns and cities of Italy and France, the women you are about to meet paved the way for a future in which females could learn the art of medicine and practise it freely. Many of them did so against a backdrop of suspicion and envy that would culminate in countless women being tried and even tortured for performing procedures and dispensing treatments (including a 60-year-old Tuscan nun who was strung up by the arms for having the audacity to administer ointments derived from betony to women in labour).

Despite widespread persecution and successful attempts to stymie the progress of female medical professionals, it is testament to the impact of these groundbreaking women that their legacies continue to live on today.



Commissioned by King Frederick III, the Mother Church was built in Sicily 1314, throughout which Virdimura travelled tending to the sick

VIRDIMURA

Late 14th century

A Sicilian doctor of Jewish heritage, Virdimura holds the accolade of being the first woman to be certified to practise medicine on the Italian island. Married to a man known as Pasquale de Medico of Catania (a port city on Sicily's eastern coast), it's likely that Virdimura was trained in medicine by her spouse. She was clearly an astute pupil, because in November 1376 she was granted her licence by none other than King Frederick III's (also known as the Simple) doctors after passing the necessary exams and being supported by the testimony of her patients. Known for helping the poor and disabled, Virdimura inspired an international award that is given to doctors who dedicate themselves to humanitarian work.

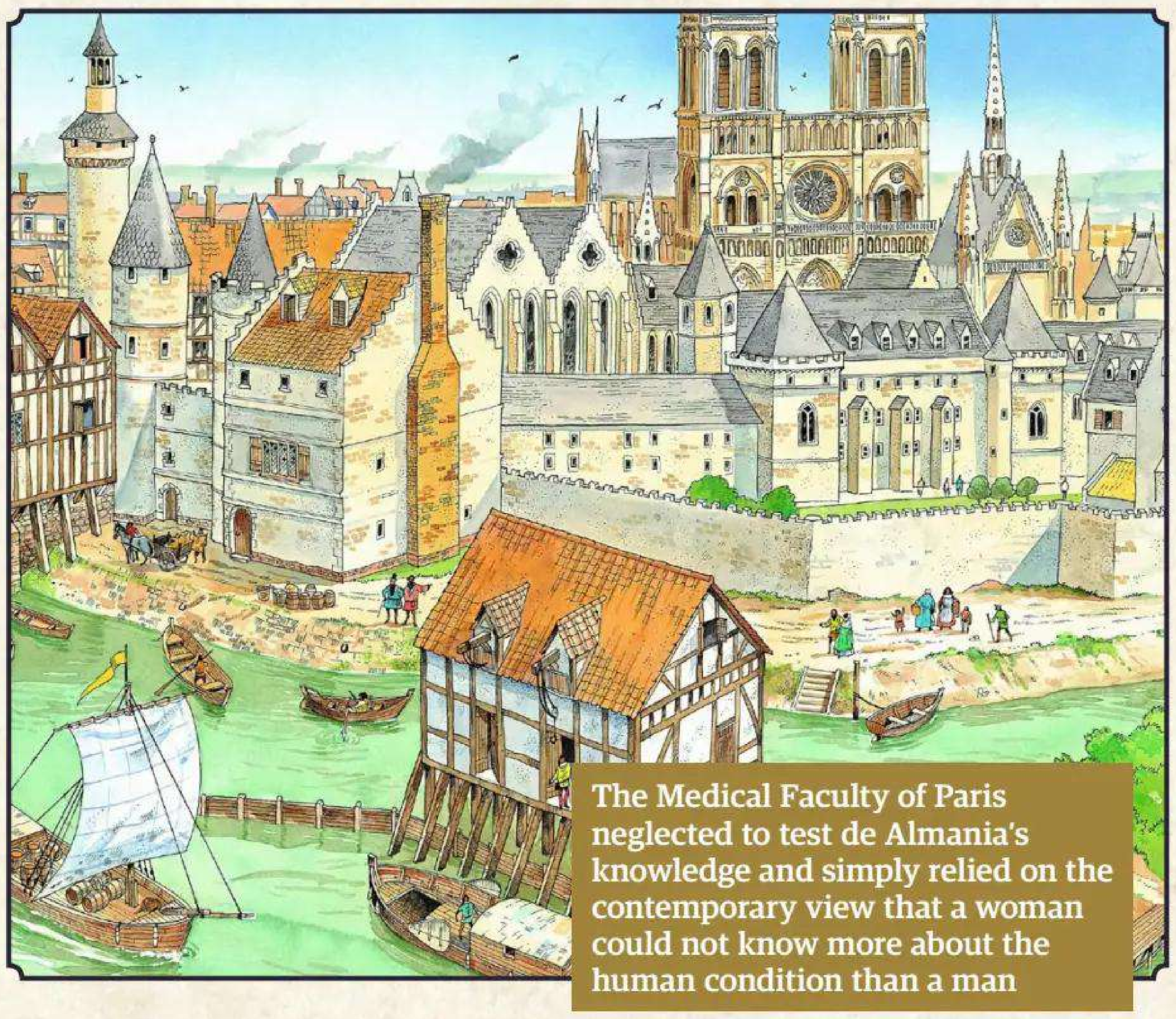
◆

JACQUELINE FELICE DE ALMANIA

Early 14th century

Hailing from Florence, Jacqueline Felice de Almania worked as an unlicensed medical healer in 14th-century France, where her methods yielded great results. Treating both men and women, de Almania firmly believed that only women should examine other women (so as to prevent men learning the secrets of 'women's business') and only charged her patients if they were cured. You might think her efforts would have been appreciated by French society, but in 1322 she was put on trial for unlawful practice. Despite the testimony of grateful patients she was convicted, fined and threatened with excommunication (a spiritual if not a literal death sentence) if she continued to see patients. The ruling had a lasting impact as it prevented women from studying medicine (and thereby obtaining a licence) in France until the 1800s.

"WOMEN WERE PREVENTED FROM STUDYING MEDICINE UNTIL THE 1800S"



The Medical Faculty of Paris neglected to test de Almania's knowledge and simply relied on the contemporary view that a woman could not know more about the human condition than a man

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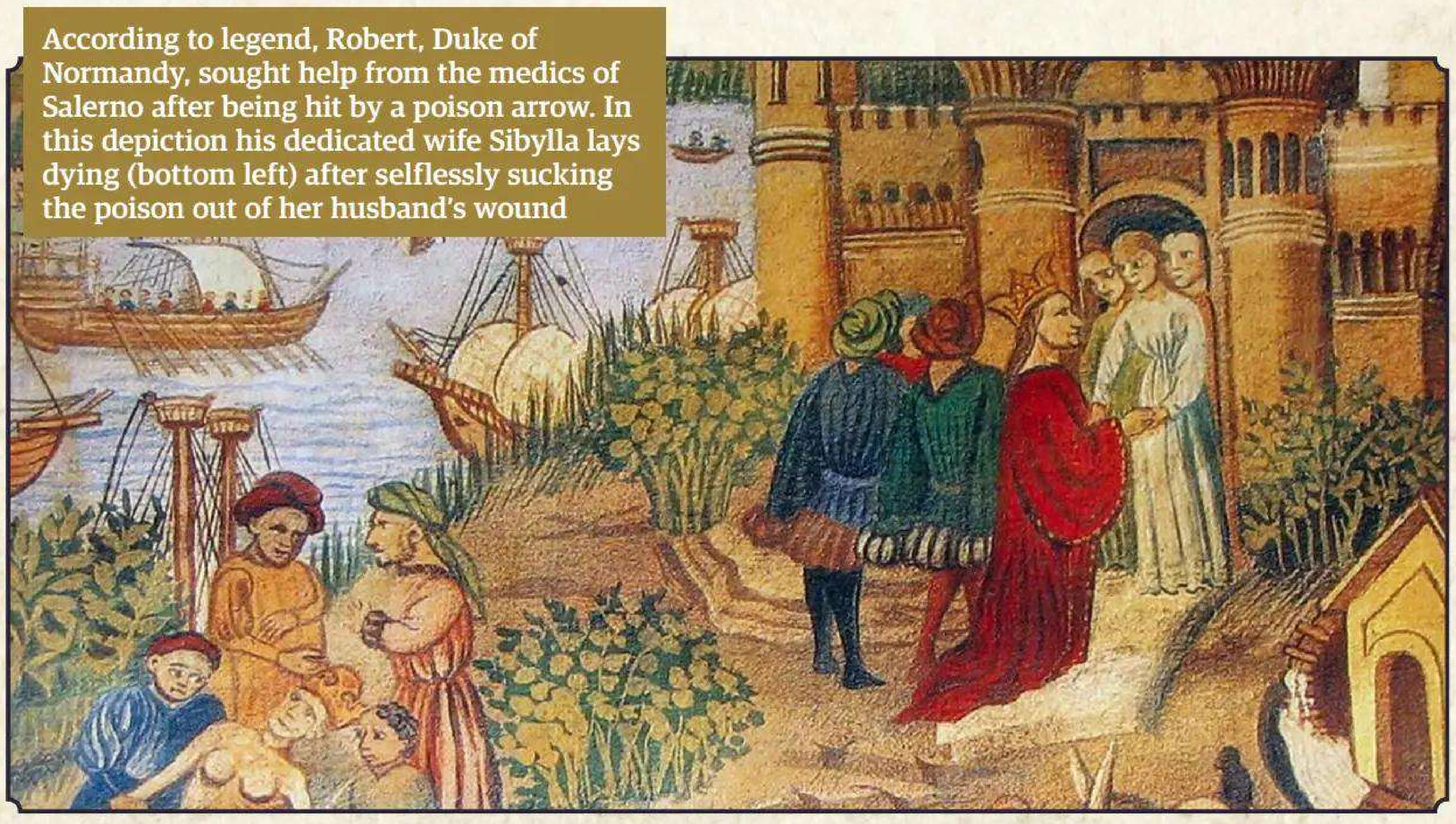


According to legend, Robert, Duke of Normandy, sought help from the medics of Salerno after being hit by a poison arrow. In this depiction his dedicated wife Sibylla lays dying (bottom left) after selflessly sucking the poison out of her husband's wound

ABELLA OF SALERNO

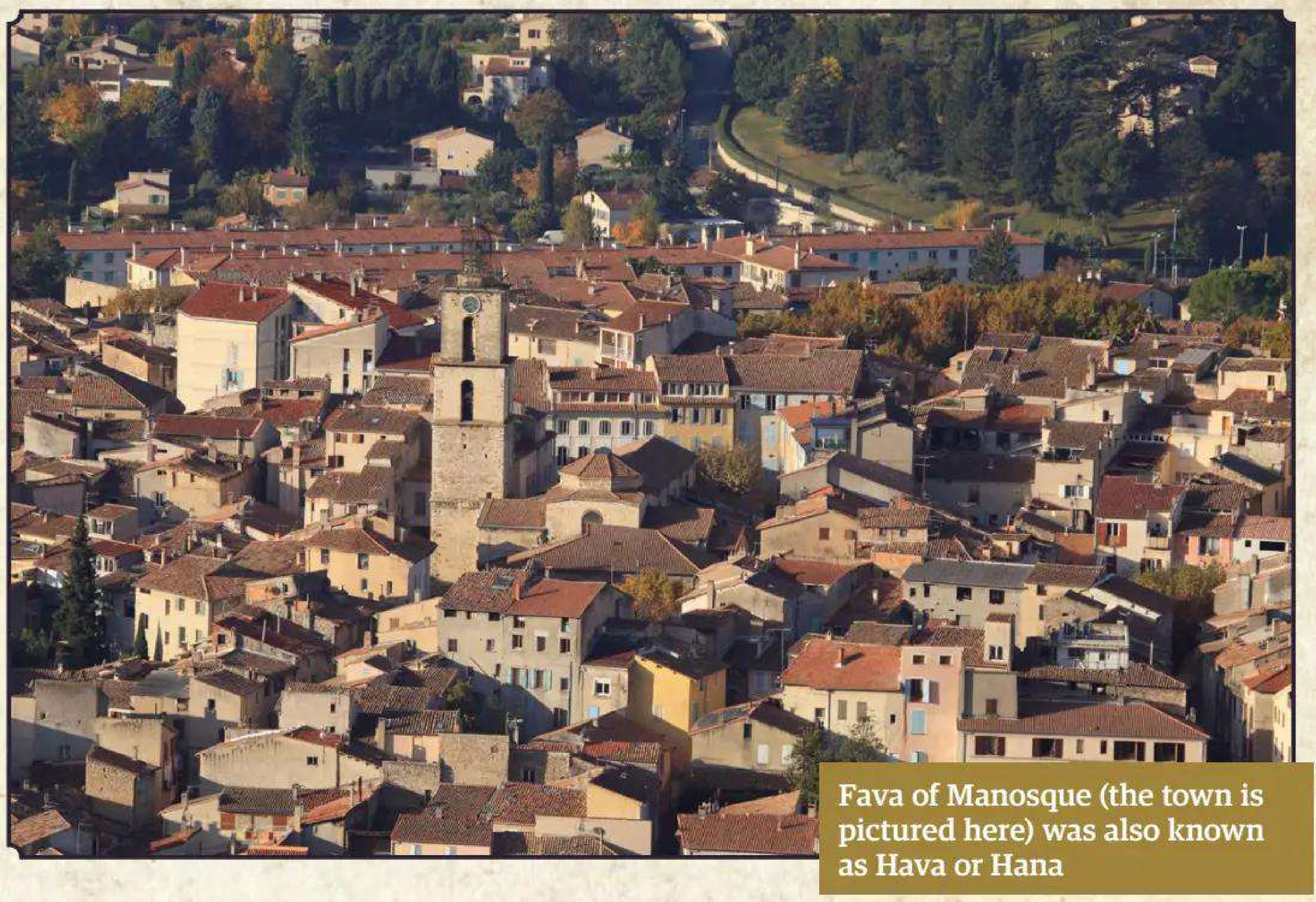
Early 15th century

Born in 1380, Abella was first a student and then a teacher at the Salerno School of Medicine, which was one of the first to admit women and provided Western Europe with the majority of its medical knowledge. Specialising in embryology, she is remembered as one of the Mulieres Salernitanae (Women of Salerno), a group of female physicians who blazed a trail in medieval Italy. Abella shared a familial link to Giovanni of Castellomata, Pope Innocent III's doctor, and during her life she penned two works titled *On Black Bile* and *On the Nature of the Seminal Fluid* (seminal fluid being sperm). Unlike their author, sadly neither of them survived.

FAVA OF MANOSQUE

Early 14th century

A Jewish physician from Provence, Fava of Manosque hailed from a remarkable family of medical professionals. Her mother Astrugus was a surgeon, as was Fava's husband, their son Bonafos and two of their grandsons. It's likely that she was trained in medicine by her spouse (at the time Jews were not allowed to study in medical schools). Putting this religious discrimination aside, Fava treated both Jews and Christians, but sadly her contributions did not receive the appreciation they deserved. In 1321 or 1322 she was put on trial for treating an unfortunate man named Poncius Porcelli who had received a serious whack to the testicles. At the time a man's testicles were viewed as being far too intimate for a female doctor to palpate (to examine by touch). When asked if she had studied Porcelli in this manner, Fava denied doing so, stating that she had merely guided her son on how to treat their injured patient.



Fava of Manosque (the town is pictured here) was also known as Hava or Hana

◆

Seen dying in this painting, radiocarbon dating of King Louis IX's jawbone suggested he'd suffered from scurvy and schistosomiasis, which is also known as 'snail fever'

MAGISTRA HERSEND

Mid 13th century

Licensed female physicians were relatively scarce during the Middle Ages, but female official royal physicians were rarer still. The courageous Magistra Hersend was one of them. A surgeon who worked for King Louis IX and his queen, Margaret, Hersend accompanied the king on the Seventh Crusade in 1249. While in the Middle East she was paid 12 French deniers (pennies) a day to tend to camp followers, and in Acre she was given a life pension by a grateful King Louis.

As for the campaign to retake the Holy Land, it proved to be a disaster. The Christian forces were annihilated in Egypt and both Louis and Hersend were captured. They were later released, allowing Hersend to return to France and her husband Jacques, the king's apothecary, who Hersend had married in 1250.

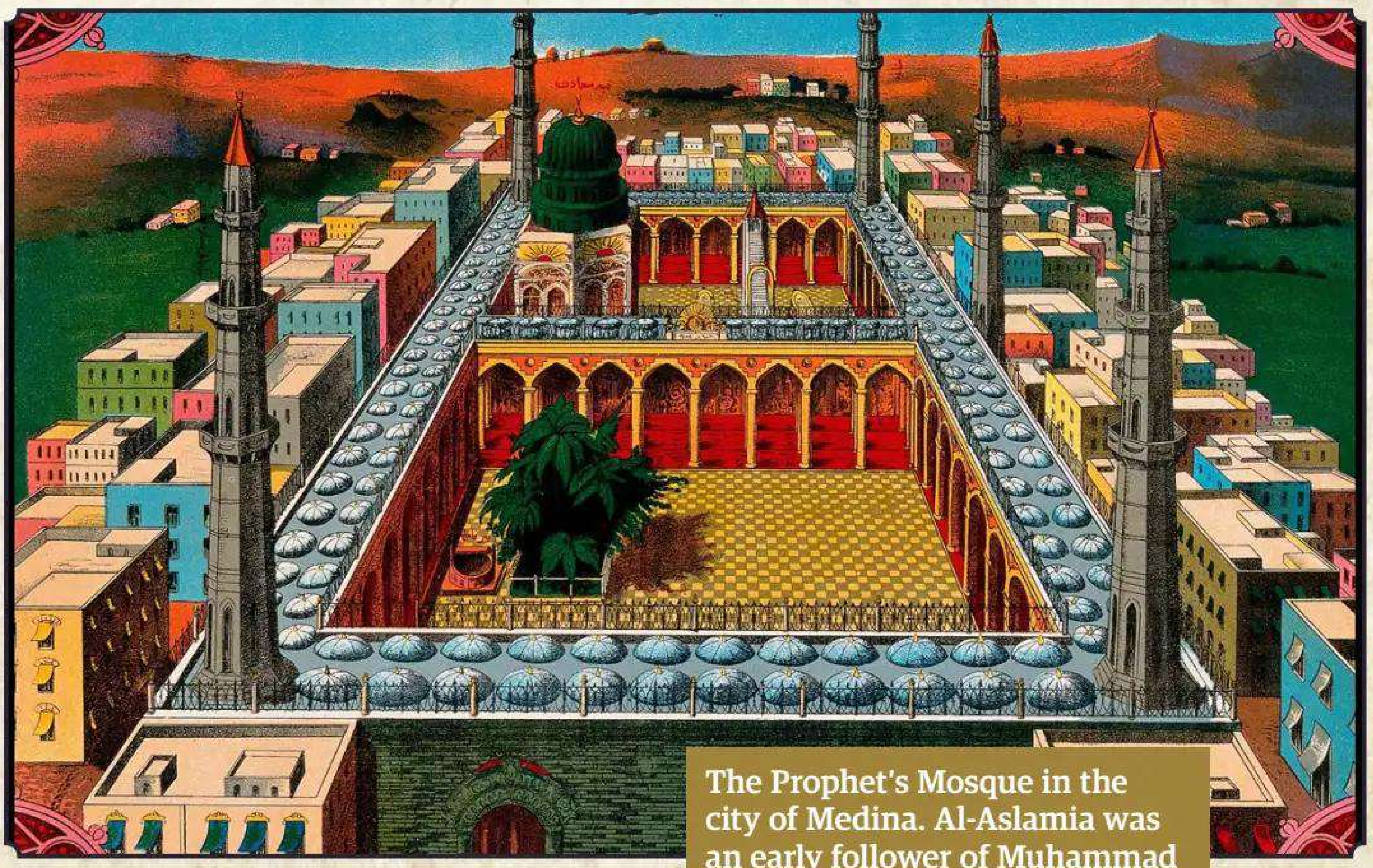
Louis would embark on another attempt to reclaim former Christian holdings in 1270, where he perished not at the hand of the enemy but dysentery, which took his life in Tunis a matter of weeks after he had journeyed to the region.

◆

RUFAIDA AL-ASLAMIA

7th century

Born into the Bani Aslam tribe in Hejaz, Saudi Arabia, in the 7th century, Rufaida Al-Aslamia is considered to be the first female Muslim nurse, if not the first female nurse in human history. Trained by her father Saad al Aslami, who was also a physician, Rufaida taught other women and her wider community about the importance of hygiene and how to generally improve medical practices. Renowned for her kindness, she helped orphans and the poor, but her most famous work was undertaken on the battlefields of the Arab Peninsula during the Prophet Muhammad's campaign to spread the reach of Islam. Present at several clashes, Rufaida helped to stabilise wounded troops and received a share of the spoils of war from Muhammad in recognition of her work.



The Prophet's Mosque in the city of Medina. Al-Aslamia was an early follower of Muhammad

Leeches have long been used for treating a variety of ailments. Their name is derived from the Middle English leche (blood-sucking worm)

MEDIEVAL TREATMENTS WE STILL USE

They might be centuries old – and a tad disgusting – but these treatments have stood the test of time and continue to help people today

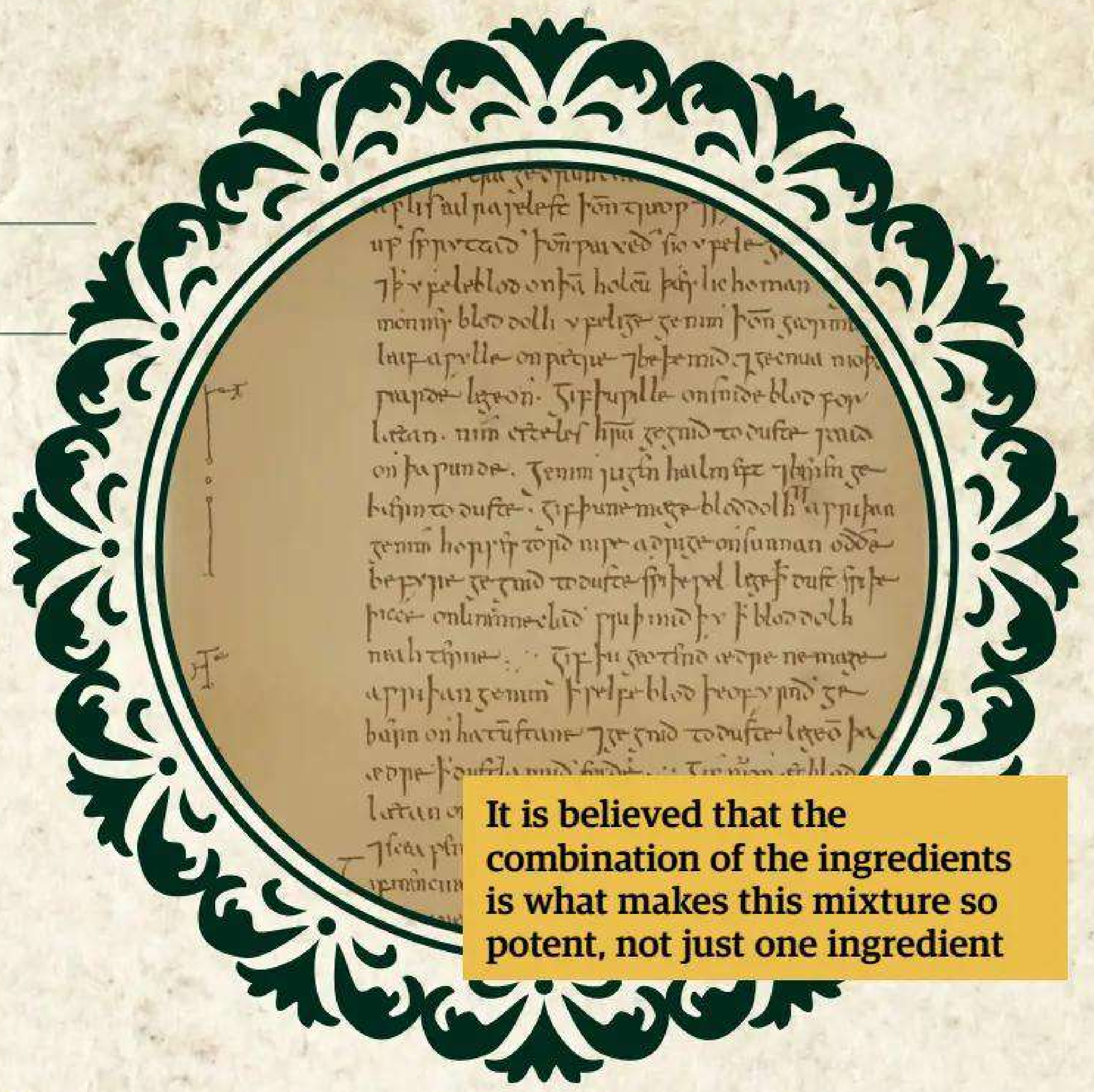
Words Bee Ginger

You will no doubt have heard the expression 'If it aint broke then don't fix it', and this certainly applies to a number of medical practises. Despite major progress in the centuries since the medieval period – not to mention the availability of cutting-edge technology – many doctors still circle back to tried and tested methods that date back over 500 years. Some are pretty unique, some are downright scary, but they are all highly effective. You will be familiar with some, such as the caesarean section, while others, such as leech therapy, might be a new – and most likely shocking – idea . Here we take a look at a few of the oldest procedures still in use today.

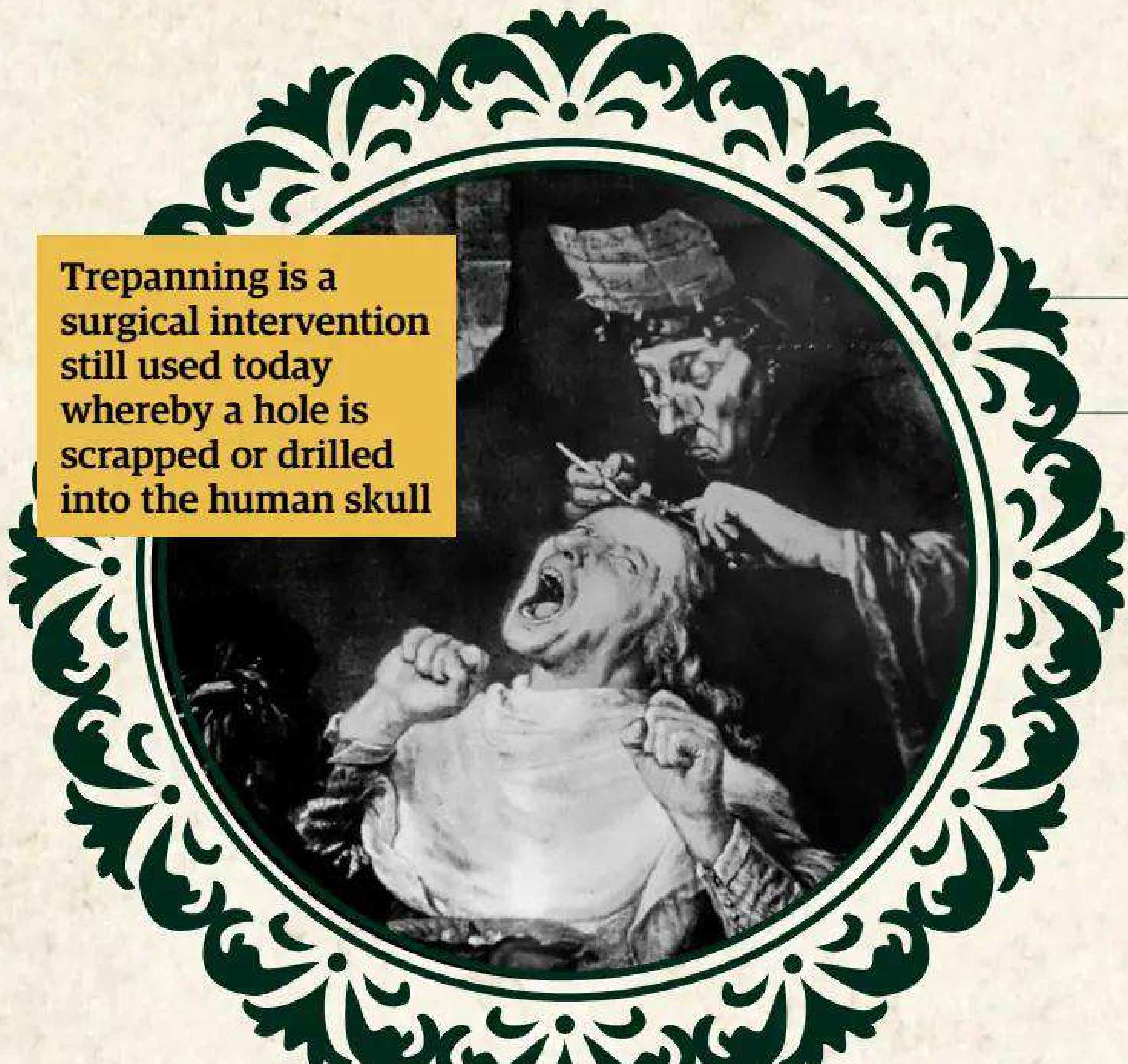
THE MRSA KILLER

10th century

Reading more like a medieval recipe for soup, an Anglo-Saxon remedy found in a volume of *Bald's Leechbook* in the British Library, originally designed to cure eye infections, has proven to be highly effective at wiping out MRSA (methicillin-resistant staphylococcus aureus). The recipe includes bile from the stomach of a cow, onion or leek, garlic and wine and is to be brewed in a brass container and left for nine days before straining. A team from AncientBiotics tested the mixture and discovered that it killed 90 per cent of MRSA bacteria in wounds.



It is believed that the combination of the ingredients is what makes this mixture so potent, not just one ingredient



Trepanning is a surgical intervention still used today whereby a hole is scrapped or drilled into the human skull

TREPANNING

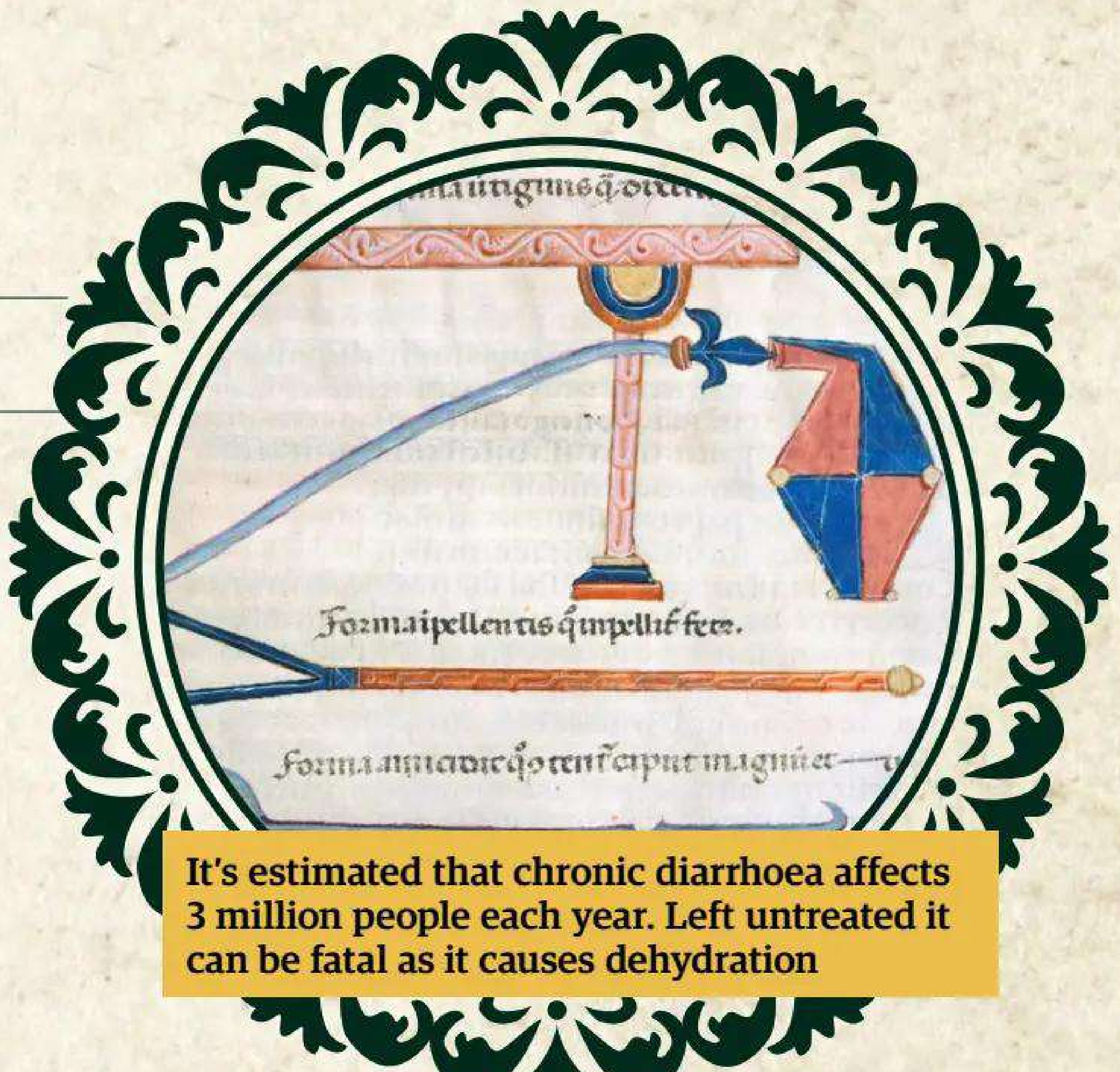
Prehistoric, common in the Middle Ages

Trepanation may be the stuff of nightmares, but physicians and doctors believe the procedure offers medical benefits. The practice dates back to prehistoric times, with evidence suggesting it was used over 10,000 years ago. Also known as burr holing, the procedure involves the drilling of holes directly into the skull, and its original purpose was to assist in dispelling bad spirits from the body. By the Middle Ages it was used to try and treat seizures and skull fractures (among other things), but today it's performed by surgeons to relieve pressure on the brain following a serious trauma.

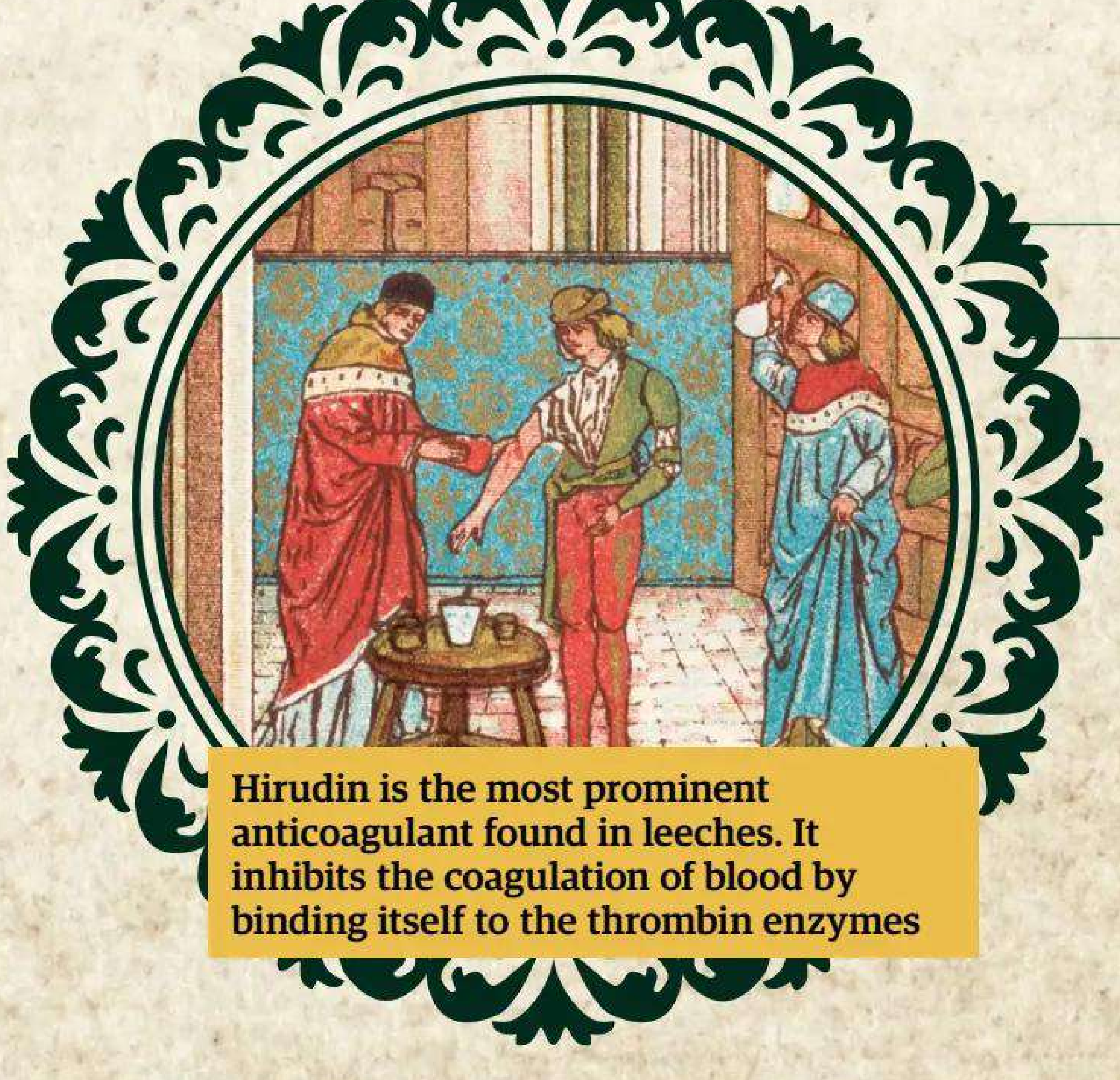
FAECAL TRANSPLANT

4th century

According to unearthed Chinese documents, using faecal matter in order to treat faecal diseases was a common and effective practice as far back as the 4th century. It remains effective today for the purpose of treating a range of infections including chronic diarrhoea, which is caused by the bacteria clostridium difficile, and other gastrointestinal issues. This microbiota transplantation aims to help rebalance the microbiota and bacteria in your intestines. Today this miracle microbiota is thankfully transferred directly from the donor into the patient's intestines by colonoscopy, nasoduodenal or nasogastric tube, enema or capsule. People in the medieval period weren't quite so fortunate: they had to consume a soup-like concoction with faeces in it!



It's estimated that chronic diarrhoea affects 3 million people each year. Left untreated it can be fatal as it causes dehydration



Hirudin is the most prominent anticoagulant found in leeches. It inhibits the coagulation of blood by binding itself to the thrombin enzymes

LEECHING

Prehistoric, common in the Middle Ages

Dating back almost 3,000 years, the use of leeches as medical devices continues to be a primitive but effective form of pooling blood following a surgery. Originally used to cure serious illnesses, headaches and fevers through bloodletting (withdrawing blood from the veins), leeches continue to be used following reconstructive surgery, skin grafts and to aid circulation. When applied to the body the leeches will secrete saliva containing compounds and enzymes that help to inhibit the coagulation of the blood.

MEDIEVAL MEDICINE

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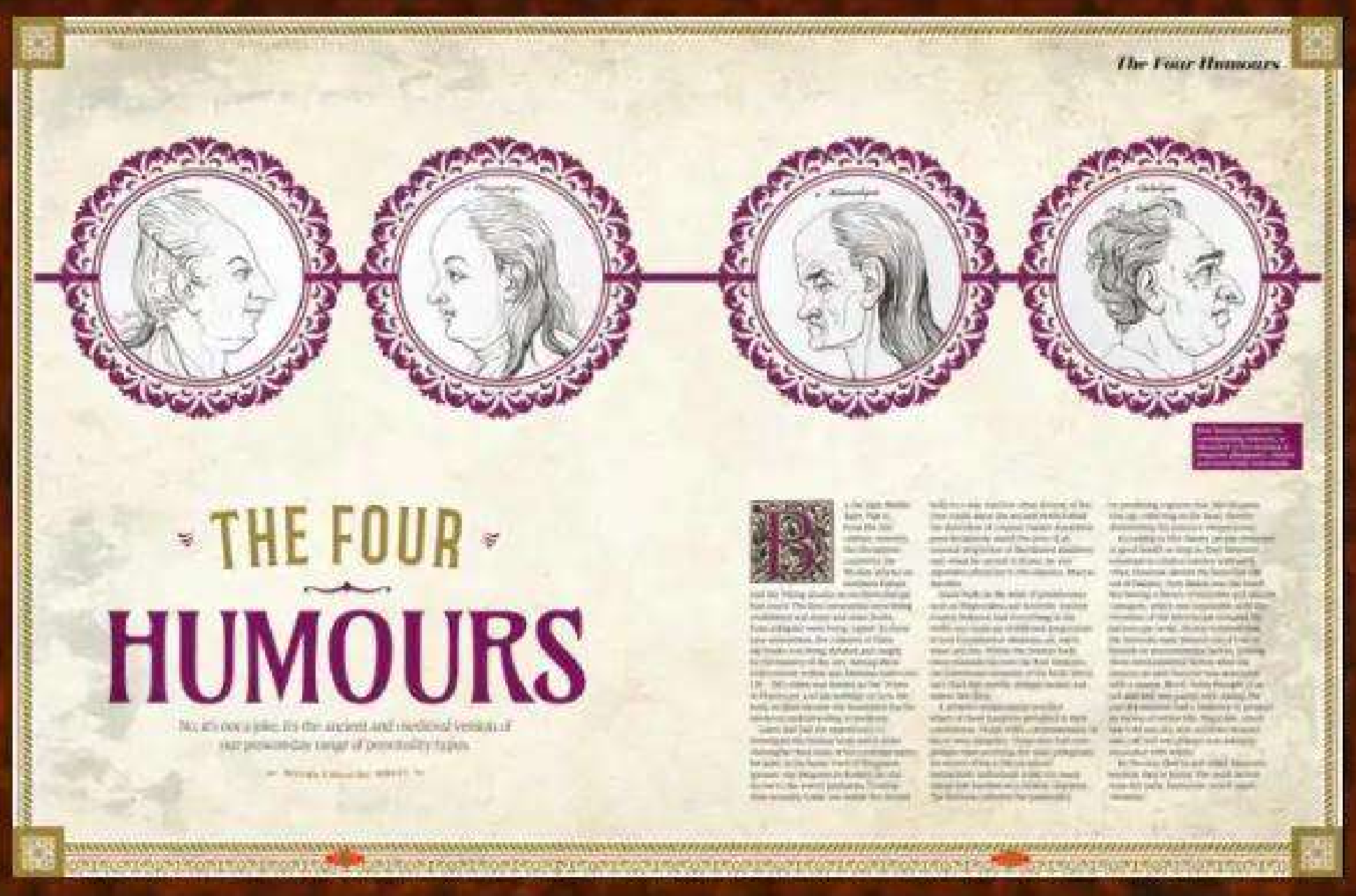

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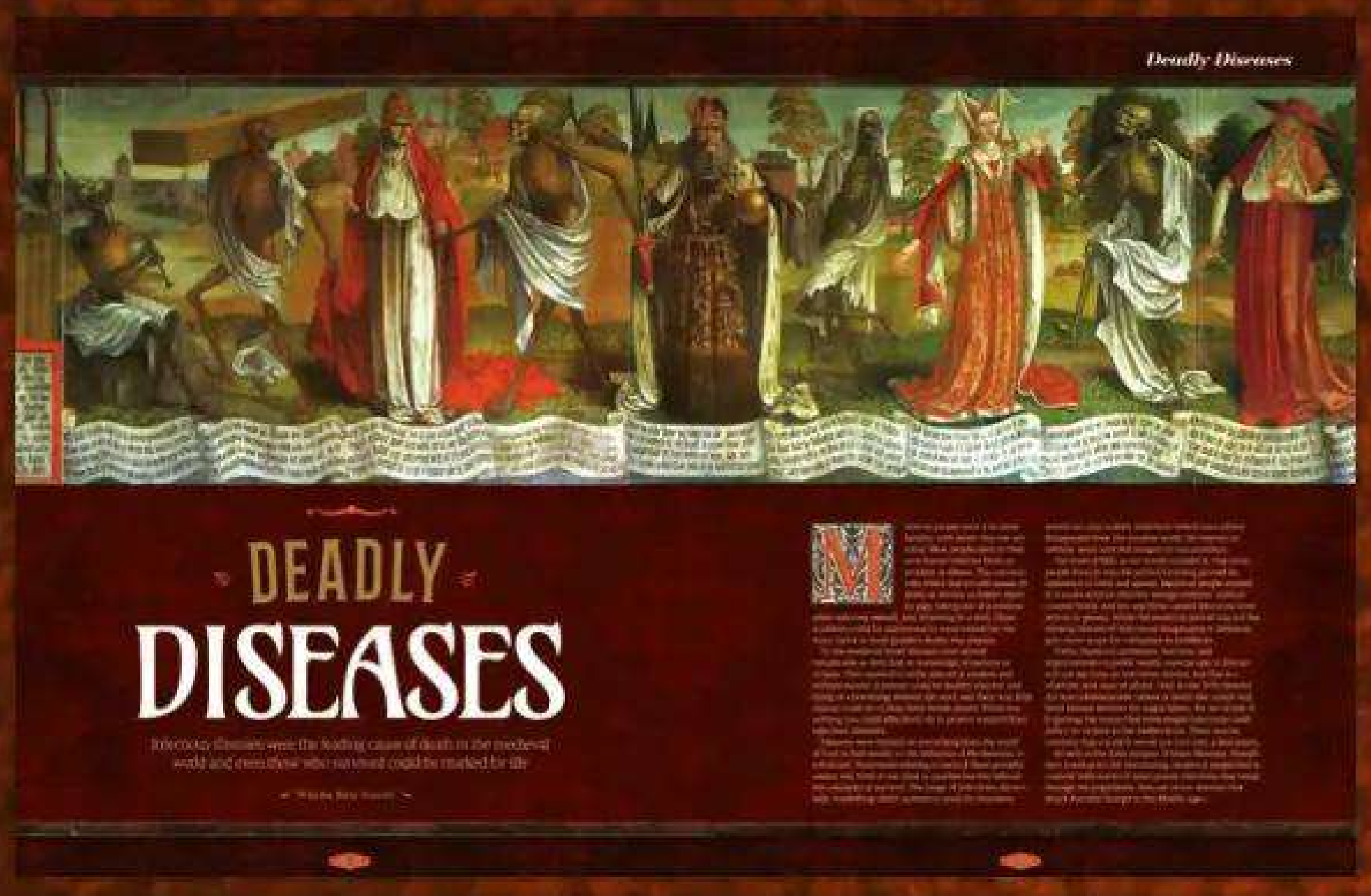
THE FOUR HUMOURS



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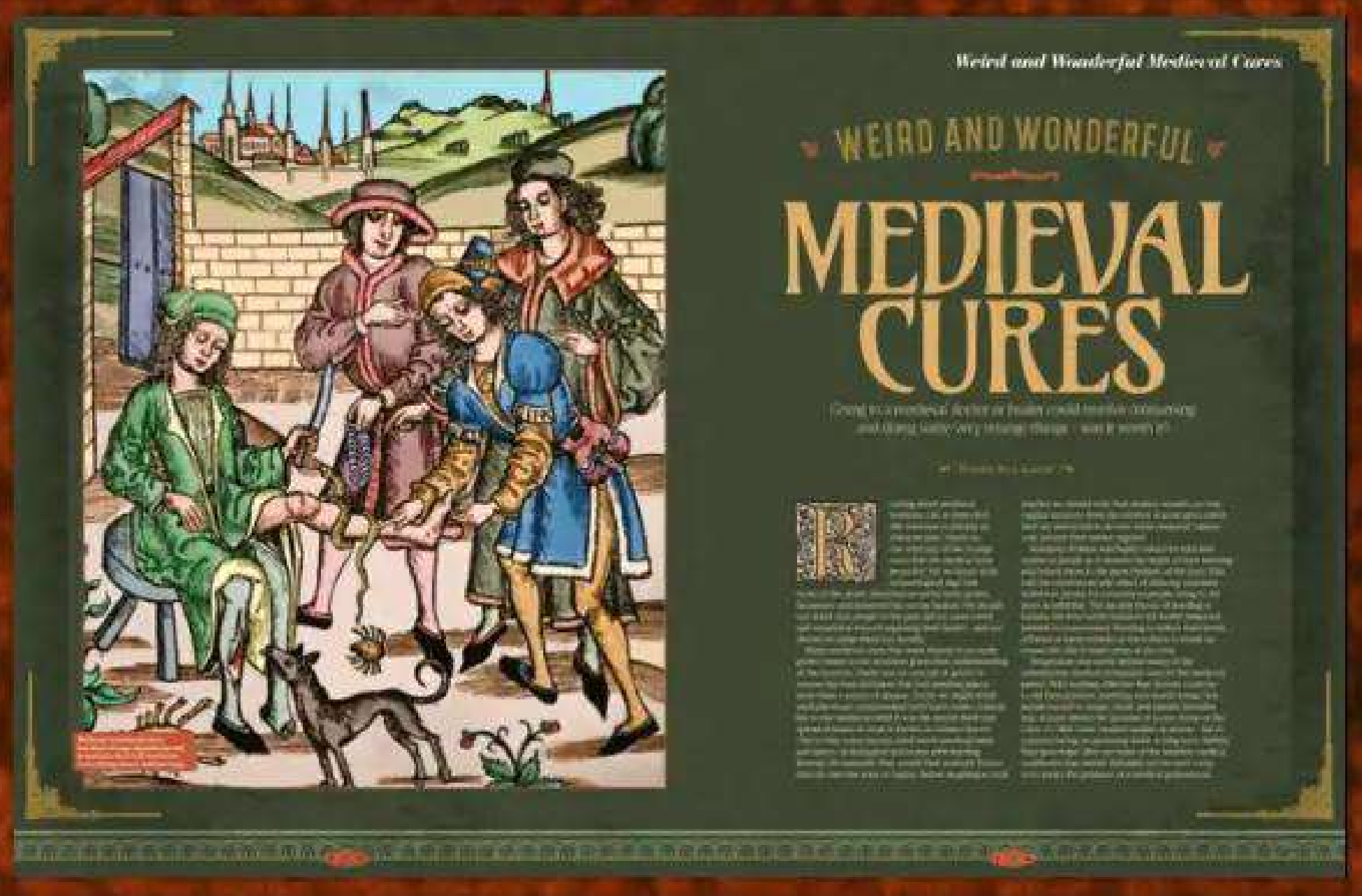
DEADLY DISEASES



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WEIRD AND WONDERFUL MEDIEVAL CURES

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